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ATTACK OR DEFENCE STRATEGICALLY AND TACTICALLY CONSIDERED.

By Captain MAUDE, late R.E.

SINCE the war of 1870 and the era of improvement in fire-arms consequent thereon, a tendency, to use no stronger term, in favour of the defensive as a tactical form of action, has made itself very conspicuous in contemporary British tactical literature, and the tendency seeks to buttress itself up with the traditions of the most glorious epoch in our military annals, viz., the Peninsula and Waterloo.

But, gentlemen, the conditions of war have altered very much since those days, more so, indeed, than the weapons in use, the only factor to which this school appears to attach any importance. Breech-loaders and perfected shrapnel are certainly concrete facts with which we shall have to deal, but I submit that short service, the development of communications, the chronic state of peace as opposed to a chronic state of war, the spread of "book" education, and other factors which might be mentioned, all multiplied altogether overlay the influence exerted by changes in armament.

There is only one condition that remains unaltered and unalterable, and that is the incidence of *Death*; and I believe I represent correctly the opinions of the "great majority" in saying that they, as a body, are profoundly indifferent as to which end of the rifle the bullet that lost them the number of their mess was originally inserted at. If ten thousand death-dealing projectiles, the modern Valkyrii, sweep a given plane in a given space of time, the problem we have to solve is how to encounter that storm of fate with the greatest

possible certainty of victory and the least possible total expenditure of our material.

In considering this question it is as well to begin at the beginning; most of the existing confusion in tactical thought is due to the fact that we have generally begun at the end, or at best in the middle, but have ignored the initial proceedings altogether.

Let us take two great modern armies, the product of universal liability to service and an average of two years' training, suddenly expanded to war strength by the telegram "Krieg mobil" or its equivalent.

If we assume the forces equal throughout in all respects we get back to the problem of the irresistible force and the immovable post on an infinite plane, and it is mere waste of time to discuss it.

The efficiency of an army is the product of the efficiency of its respective arms and branches, each of which is influenced by many factors. Let us assume a slight differentiation in one of these factors, and let this factor be the conception of *Duty* existing throughout the nation, and follow the consequences of this slight variation.

We will call our contending forces A and B, and assume A to be the nation with the highest sense of duty.

And now note the consequences. In A, because the sense of duty is highest, rolls of Reservists will be more accurately kept, orders will reach them quicker, railway trains will deliver them more punctually, and they will shake down into their new situations more rapidly. Contractors will deliver better stores, boots will be better, clothing better, rifles will not burst or bayonets bend, and cartridges will be filled with powder—not with sawdust; it is, therefore, a safe prediction that the armies of A will be ready for action and in better "fettle," to use a Yorkshire term, in fractionally less time than those of B, the amount of time thus gained being proportional to the difference between d and d' .

Still this concentration takes time—time measured by days, and meanwhile on either side are forces which require minutes only, and not many of them either, viz., the cavalries, to get under way.

While the armies are completing their strategical deployment in rear let us note the consequences that the pursuit of duty—for duty's sake—entails in this arm.

Men fighting on their own feet may make up in a variety of ways, by fanaticism, innate personal bravery, &c., for neglect of minor details of duty in peace-time, but with the mounted services, particularly the cavalry, the horses reflect, with mathematical accuracy, the precise degree with which these minor duties have been carried out, always provided that the system on which these details are based is a correct one; but we have assumed the contending forces equal in all respects except in this one of duty, and therefore can confine ourselves to this point alone. Given equally good systems, the more punctilious discharge of duty will ensure superior condition, superior mobility, and, finally, superior cohesion in the charge—but this spells Victory, as I will proceed to show.

The opposing cavalries will be face to face with each other in a few

hours, but neither side has anything to gain by attacking immediately, for it is always the wisest plan to let a sleeping dog lie until you are prepared to deal with him. They will, therefore, for the moment form two opposing cordons, and since both will endeavour to keep touch with the other, any withdrawal on the one hand will be met by a corresponding advance on the other, and from day to day the line will assume an undulating character.

On the sixth day, let us assume, A is ready to move, and orders in this spirit go to the cavalry leaders commanding the screen. Their immediate action will depend on the nature of the country in front of them. If it is open and relatively unguarded, the main bodies of infantry being miles behind, they will ride straight to the front, confident in their power to draw the enemy to concentrate against them, and to deal with him when the necessity arises.

The advantage of the offensive in cavalry work can hardly be overrated. Minutes are then of more importance than hours to the infantry; lines of retreat are almost immaterial to them; you either win or you do not, and defeat should mean disaster to the beaten side.

Given a long line of cavalry outposts, extended according to the orthodox method. The attacking force coming on at a brisk trot is seen at say 1,500 yds. distance. Minutes only, and few of them, can be gained for the opposing concentration: those who have seen it tried know how few. In nine cases out of ten it is open to the assailant to choose his own conditions of light, wind, and background, and what advantage these conditions, when all combine, entail, the practical soldier can judge. Then pace and condition decide, but these are a consequence of duty better performed, and therefore presumably on the side of A, who can hence manœuvre to induce the masking of B's guns by his own horsemen. But with guns and cavalry against cavalry alone the result cannot for a moment be doubtful, and since, as a consequence of duty conscientiously carried out, condition and speed are on the side of A, in the resulting *mélée* B cannot get clear of pursuit, and if A sticks to his enemy in true cavalry spirit, "to the last breath of man and horse," B can only escape annihilation by a miracle.

If the ground behind B is broken and occupied with frontier guards on foot, A will fall back, and the cavalry screen acting almost automatically, B will be drawn into country which offers A more favourable conditions, and the ultimate result will be the same. B will ride up against A's frontier guards, will be shot to pieces and charged in the most unfavourable direction, and the expenditure of the "last breath of man and horse" will reap the same favourable result for A.

Hence, from the very outset of the war, this one slight differentiation in the spirit of duty will have borne fruit, and in precise proportion to the magnitude of the difference.

Meanwhile A's main body is moving forward, with its corps at close supporting interval and distance. B is still necessarily engaged in flanking marches to complete concentration.

A's cavalry having been victorious, in proportion to the extent of that victory, A's infantry can sleep in peace and preserve its fighting power relatively intact for the great decision.

B's main body must not only march both faster and further, but his infantry will be worn out all night by outpost duty, and the accuracy of his musketry fire will be seriously discounted beforehand.

If the start thus gained by A is considerable, then his corps advancing, ready to fight at a moment's notice, will probably encounter B's, as shown in Plate 35, either as Fig. 1 or Fig. 2, and the consequences must be as depicted, unless B develops an altogether unexpected fighting capacity.

The variations on this theme are almost endless, and every one can work them out for himself, always allowing for differentiation in the quality of the two cavalries, which must have worked itself out by this time.

But we will assume that the line of B's frontier is so densely held that he has been able to occupy a position with, say, 10 corps, and to entrench it or not, as he may have preferred.

Such a force would occupy at least 20 miles, and possibly more, and, since it is only necessary to burst through that line on a front of 2 miles, considerable uncertainty must exist as to which precise 2 miles will incur the brunt of the attack, and, by hypothesis, he has no longer any cavalry capable of adequate scouting.

Let us assume B's army to be devoted to the cult of the shovel, and to pin its faith on tactical key points, not an extreme assumption in the circumstances of the day.

It frequently happens that in war the tactical lay of the ground by no means corresponds with the strategical requirements of the situation, and, again, between the ideal position, with gentle glacis-like slopes, exactly intersecting the line of the enemy's approach, and the ridges all tending in the line of that approach, there is a considerable limit of variation.

But we will take the conditions most favourable for the defence—ridges transverse to the direction of attack.

Then since, by hypothesis, the cavalry of the attacking force has demonstrated its superiority, and in proportion to the degree in which that superiority has been proved, the defender cannot tell precisely on which 2 miles of his front out of the available 20 the shock is about to fall. He, the defender, must therefore be equally prepared at all points, and the bulk of his reserves are consequently constrained to a central position.

Now, in a great *initial* struggle, it will be as well to make sure of your bear before contracting to deliver the skin, and to sacrifice the probability of victory to its possible consequences would be the grossest conceivable error.

This thrusts the *tactical* decision into the foreground; there will be time enough to reap the consequences of victory when the battle is won. This was not always the case, for reasons which are too obvious for investigation now.

The attacking force, therefore, masses its men into that particular

direction which promises most immediate results, and it by no means follows that this direction promises either strategical consequences or local tactical advantages, though the latter are the most probable.

While the assailant is thus massing for the attack, let us turn to the defender for a moment. We have assumed that he occupies the most favourable position in plan, let us now consider it in profile.

Confining ourselves only to the broad undulating features of the ground in which alone great masses can be manoeuvred, we have only three possible sections. Variations are introduced by the length of the slopes, but I will select the most difficult for the attack, *b*.

a is very rarely met, except where the ridges are relatively close together, say, from 1,500 to 2,000 yds. Then there is a dead angle between the two, in which infantry can rally unobserved.

b is the most common, or a variation of *a* and *b*, as in *d*. Then the longer the lower limb of the slope the better for the assailants, for the defender's artillery is masked by his infantry, as the lines of fire on the diagram show.

In *c*, and as the portion *x y* is long or short, the assailant can choose his own range from *x*, and disregard the defender's guns entirely until the moment for the assault arises, when a turn of the elevating screw will enable him to keep down the fire of the latter, and, at the same time, to prevent either the supports for the infantry at *x* arriving, or its orderly retreat.

It may be argued, why should the defender's guns and infantry be separated; why not put them in the same line at once? The answer is that practically you can't.

If you attempt it, then "skirmishers," using the word in the old light-division sense—which is totally distinct from the skirmishing of the Napoleonic or German 1870 epoch—can creep up and pick off the gunners at their ease, under any ordinary conditions of ground, and thus materially assist the attacking artillery in the preliminary duel.

On the defensive, the guns must be protected by infantry, and that infantry must be at least far enough in advance both to keep these skirmishers at a distance and to be safe from the dangers of "prematures."

On the other hand, supports for this infantry cannot lie out on an exposed slope between the guns and the firing line, for they would simply form passive targets for both the guns and infantry of the assailant.

Nor can they be placed immediately behind the guns, or they would play the part of mere stop-butts for the enemies "overs." 600 yds. is the least distance which will save them from this unsatisfactory rôle.

Balancing one condition against the other, the most favourable section of ground I can find for defence is as shown in *d*. And when the defender's guns at *P* have been reduced to silence or compelled to retire, as they must be before the actual assault can be delivered with any prospect of success, from *T* to *R* is still 1,200 yds., and 600 of it, from *P* to *T*, must be crossed in the full sweep of the enemy's shrapnel.

I purposely pass over the possibilities of confusion in the reserves, as a consequence of the enforced retirement of the guns; equally, I ignore the depressing effect on the nerves of the fighting line, due to the cessation of their fire.

My case is strong enough to dispense even with these very important factors of the whole.

Now to revert to the attack.

The defender's cavalry having been decisively beaten, the assailants can start boldly out to the front, screened and protected against possible ambush or surprise by their own horsemen.

Let us take an attacking force of two armies, say, 10 corps, formed as in Fig. 3, eight in first line, two in reserve.

Choosing their own positions, within limits, and practically simultaneously, some 20 miles of batteries (10 to the mile) unlimber, and the artillery duel commences.

The defender must either renounce his position, and come out and attack himself, when the gunners simply limber up and trot out of the way, or he must stand still to be pounded at, when it becomes more or less a case of machines against human nerves.

Here we come on another dilemma for the defender, either he has constructed his epaulements beforehand, and his guns are ready in position, when it may happen that the assailant appears in an unexpected direction, necessitating a change of front and the abandonment of the works constructed—a case that has frequently occurred in war—or his batteries are held back in hand, under cover, till the intentions of the other side have disclosed themselves, and then his batteries are compelled to come into action under fire, a proceeding which can hardly be undertaken without heavy loss. Of course the same applies, to a considerable extent, to the assailants, only the latter enjoys, as a rule, a far wider choice, both of time and position, and is therefore more likely to effect his purpose without serious injury.

Both sides will now soon be engaged in a heavy cannonade and, under cover of the confusion, the assailant masses his forces for the decisive blow opposite the point of his own choice, the bulk of the infantry being retained far back to the rear, and under cover. The artilleries of the two reserve corps trot up to the front. As they near the guns already in action the latter raise their fire to the utmost intensity possible and whilst the enemy's front is hidden by the smoke and dust of bursting shells the new arrivals sound the gallop, dash through the intervals in the first line, away down the slope, unlimbering some 1,000 yds. closer in.

We have now on a front of some two miles a numerical superiority of two to one in guns, and assuming anything approaching equality of skill in the gunners on either side, the result cannot long be doubtful.

What will this result be? Another dilemma for the defender—either he stands his ground, accepting total destruction, or he limbers up and withdraws in the hope of finding a better opportunity later in the action. Neither alternative is exactly inviting and the latter perhaps the least of the two, nowadays when no favouring smoke-

cloud screens the retirement, and one has to consider the nervous impressionable natures of the young peace-trained conscripts, who will not remain unaffected by the sight of their comrades going to the rear, in however orderly a manner the movement may be effected, and the possibilities of a *disorderly* withdrawal must also not be left out of our calculations.

The assailant's guns are now left free to devote their undivided attention to the infantry, and the question arises what is the result likely to be?

The unanimous testimony of Continental experts who have undergone this "ordeal by fire" is, that it is a very unpleasant experience indeed, and that the crash of bursting shells soon reduces the best of infantries to a condition of nervous prostration which renders futile any hope of accurate controlled fire action, and it must be remembered that since the introduction of rifled weapons, nothing approaching the intensity of modern artillery fire has been endured. The Germans, in 1870, had no reliable shrapnel. Their common shell was five times less effective, on an average, than the ordinary double walled shell, and still further behind the new high explosive ones in use all over the Continent. Further, not one battery in five, probably, had ever been really taught to shoot. So that the results actually obtained may everywhere be put down as a minimum. Yet some of these were striking enough. The duel between the eight guns on the Rotherberg against the 64th French line regiment behind a substantial entrenchment at 600 yds., which ended in the defeat of the latter, is sufficiently suggestive, and Gnügge and Haas's batteries at St. Hubert are also instances to the point, and many more might be quoted if my space permitted. (*Vide Hoenig's "24 hours of Moltke's Strategy."*) If, therefore, under the then existing conditions of projectiles and armaments, isolated batteries could hold their own under the most adverse circumstances of range against infantry under cover, how much more, therefore, may they be relied on to do so now when their power has increased at least tenfold, and that of the infantry in a far smaller ratio—but to that point I shall recur later.

It has frequently been asserted in this country that on the whole there is nothing the infantry soldier enjoys more thoroughly than a good steady rain of shells, and the men who have made the assertion have been notorious for the highest personal gallantry. But, gentlemen, there is always this trouble in dealing with the testimony of exceptionally brave men, viz., they are so abominably modest. It never occurs to them that they are different from other people, and because their nerves don't fail them amidst the lashing hail of the shrapnel bullets, they imagine that other people's don't fail either; but I submit that the bravest men of any army are by no means fair samples of the average man throughout that army, and that tactical forms and methods must be adapted to the general and not to the particular. However, I can afford to concede this point, viz., the moral effect of shell fire, also, provided they will allow that a dead man is not as efficient as a live one; that assumption will suffice me.

For the consequences of this artillery preparation are certain to be bloodshed, more or less in proportion to the precision of the fire and its duration, and if by the time the infantry are sent in to the attack, some 20 per cent. on the other side are lying killed or disabled, then the task of the infantry will have been very materially lightened, for under equal conditions 80 rifles will not do as much work as 100.

But I will make an even greater concession and leave the artillery out of account altogether, allowing the two infantries to fight it out without interference. I will also assume the conventional glacis-like slope and make any further allowances the other side may desire, only assuming equality of armament as the one essential element of the problem.

It is perfectly certain that the attacking side will not be stopped at the extreme range of the rifle. They will not check for the first man who falls, or for the second. How far they will go will depend on their discipline, which again is a product largely affected by the factor of "duty." Ultimately, for a given standard of discipline they will reach a given limit of distance, still preserving the power of controlled fire. Then they will halt, and reply to the enemy, and it must be obvious that the nearer they get, and the greater the control, the more effective will that reply be.

In proportion as this reply is more or less effective the enemy's bullets will come in less numbers and with less accuracy. If, therefore, the percentage of loss with which the limit a was reached by them was, let us say, x , then a following line will reach the same limit with a less loss, x' , a third line will suffer less still, and so on. So that, ultimately, given a sufficient number of lines, the attainment of a fire superiority is a mathematical certainty. Of course the other side can feed up troops in the same way, but it is evident that since he cannot know at what point to hold his reserves in readiness, the feed will not work with the same regularity and precision as on the side which has enjoyed the option of choice and the power of prearrangement.

Hitherto I have said nothing of distances or formations, and for these we must go to practical experiences.

At this point in the proceedings it is usually customary for the partisans of the defensive to trot out the unfortunate Prussian Guards, and to immolate them on the blood-stained plain in their thousands, with the same cruel dexterity and the same weapon which Samson used with such effect against the Philistines in Gath. Then on their mangled remains they rear up a fabric of forms and fancies as ludicrous as the misstatements on which they are based.

Possibly this tendency may admit of scientific explanation. In India, when the engineers propose to build a big bridge, there is a hurried exodus of babies from all the neighbouring villages, the natives believing that no structure can stand unless the foundations are laid on infants' skulls, and the brickwork cemented with their blood. This superstition appears to have been common to all Aryan races. May we not here have an illustration of Atavism to the

beliefs of our forefathers worthy the investigation of the Anthropological Society? For the idea is equally baseless in either case; the alleged holocausts never took place, either at St. Privat, or on the banks of the Jumna or Ganges, and even if they had, would be immaterial to the real question.

Von Pape's division of the Prussian Guard went into action about 3.30 P.M., on 18th August, 12,000 strong, and lay out in the open under shell fire, losing men till about 5; then both brigades advanced in rendezvous formations, and having miscalculated the power of the Chassepot rifle, were suddenly overwhelmed by a storm of lead, and found themselves compelled to execute a change of front and deployment under the most disadvantageous circumstances well possible.

It speaks well for the heroism of the men that they ever extricated themselves at all; but they did so, and then made a desperate dash forward, to get within effective range of their own weapons, but in this they only partly succeeded, for their momentum died out before they had attained to 600 paces from the enemy's position, at which distance their needle-guns were only fractionally more effective than old Brown Bess, and here they lay out, losing men all the time, until about 7 P.M. the village was finally rushed. Then ensued a scene of almost unexampled confusion, and for another five hours they served as stop-butts for the French "overs" from the great artillery duel that raged from Amanvilliers, and the firing at this point did not ultimately die out till past midnight. Having been under fire for eight hours and a half, they ultimately re-formed, 4,000 men short of their strength, or with a loss of 30 per cent., and if we concede one-third of this total to have been inflicted during the initial blunder and subsequent first rush, we have gone as far as common sense and reason can in any way justify.

What it all comes to is this: that in spite of a grave initial miscalculation, and in spite of inadequate artillery preparation, a division of Prussian Guards succeeded in reaching a 600' pace, say 500 yds. limit short of their enemy's position, and that, whether in line, column, or skirmishers, for all formations were employed, they maintained sufficient cohesion for purposes of fire control. That they subsequently failed to advance during two whole hours can be accounted for by their inefficient armament and the general consequences of their initial mistake, and by the unfavourable formation they for the most part adopted.

The exact number of rifles available to bear on them cannot be given with any approach to accuracy. I should put it at 15,000, and dividing these by half to allow for the absence of repeaters, we are still within the limits of a two to one numerical superiority laid down by Regulations as the essential condition for a successful attack.

Wedel's brigade is another case in point, and a most important one. For full details I must refer you to Hoenig's "Two Brigades," a translation of which appeared in the American Journal of the Military Service Institution, about two years ago, but which has

otherwise to my knowledge received no notice in English tactical literature. Briefly the story is this:—

The 38th Brigade, numbering 4,500 bayonets, arriving at Mars-la-Tour, after a most exhausting march, received orders to attack, in co-operation with the 39th Brigade, which was advancing from the direction of Tronville against the copses of that name. The order arrived too late, and at the moment of moving off—"Direction, the north-west corner of the Tronville copses,"—the other brigade was already beaten and in retreat, but this they did not learn till afterwards. The 2nd Guard Dragoons had already been in full possession of the ground over which the advance was about to be made for more than an hour, but the substance of their reports, if any were made, never found its way to the regimental officers who were chiefly concerned. The two batteries attached to the brigade trotted forward round the right flank of the infantry, as they stood in rendezvous formation, and as the latter, in pursuance of the order to advance, crossed the Metz chaussée, they heard the first shots fall away over towards Vionville. The next moment a perfect storm of lead and shell splinters burst on them from the north, and the mounted officers saw for the first time—the men on foot could not—the whole of the Bruville heights before them densely occupied by continuous lines of infantry and guns, in fact by the whole of L'Admirault's corps.

Instinctively, without orders, they brought up their right shoulders and endeavoured to change front to meet the newly disclosed danger. The 16th Regiment on the left naturally completed the wheel first, and some of its companies got into the ravine by La Gleyère farm, where they were met by a counter-stroke of the French, and lost 300 prisoners; but the 57th (two battalions) and the two pioneer companies on the right had further to go; they simply raced forward never stopping to fire, in skirmishers, small columns and line, ultimately reaching the southern edge of the ravine, whence they opened a rapid fire which soon shrouded their front in smoke.

Hoenig, to whose work I have referred above, was adjutant of the fusilier battalion of the 57th, and rode with his Colonel von Ruell, in the centre of the line; they reached the edge of the ravine, and there von Ruell fell mortally wounded, and the next moment Hoenig was hard hit himself. Lying on the ground he took a last look around him, and the scene, as he says, is indelibly burnt in on his brain; to his left a long straggling line of skirmishers on the ground firing as fast as they could load, to his right two companies erect in line, which had just fired a volley, and the surviving captain—mounted with the colours in his hand—was calling on them to advance, when through the smoke and not ten paces distant, burst forth the bayonets of the French infantry, who, some six battalions strong, had been laying for them in the ravine. That was enough; the whole turned and ran, followed by the French, until the dashing and self-sacrificing charge of the 1st Guard Dragoons put a stop to their pursuit.

Hoenig calculates that one-third of the total loss was incurred in

the advance up to the edge of the ravine, one-third more during the fire fight, and the remainder during the retreat.

The net result for the purpose of my argument is therefore this: viz., that good troops succeeded in advancing from 2,000 yds. to within 500 yds. those units in close order, still retaining the power of controlled fire in the teeth of the bullets and shell delivered by 12,000 rifles, 60 guns, and 12 mitrailleurs, and in spite of want of artillery preparation and the counter-effect of their own return fire. Divide the French numbers as above by two to allow for the absence of repeaters, and the numerical superiority still remains largely on the side of the defenders, but even this did not suffice to stop the assailants.

Therefore the conclusion is justified that whether in skirmishers, small columns or line, and without artillery preparation, infantry can count on reaching a 600 yds. limit, even allowing for repeaters, provided they will stand up to a 15 per cent. punishment; and perhaps these figures are the best data to work on, for we are unlikely ever to see again at the commencement of a great war the war-trained long-service veterans who made the strength of the old Napoleonic War, of Wellington's Peninsular army, and of Grant and Lee's splendid infantry. Still it is worth while calling attention to their endurance, and recalling the fact that the losses they bore without flinching were inflicted within the space of a few minutes, whereas these modern losses frequently took hours. Compare Albuera, Chillianwala, and the 24th, or lest I should be accused of chauvinism, the consequences of a somewhat similar blunder to that of St. Privat and Mars-la-Tour, in the case of the French Imperial Guard at Waterloo, Or, again, the punishment borne by the French and ourselves at the Malakhoff and Redan respectively. The case of the Redan is specially worth attention, for whatever else stopped us it was certainly not the fire, yet the actual storm of projectiles encountered across that 600 yds. of open was considerably greater, I would say many times greater, than anything troops have been called on to face in more recent times. Take Todtlenben's plans, and you will see at least 100 heavy guns, mostly 36-prs., crossing their fire on our line of advance, to say nothing of their infantry lining the parapets, and if you calculate out the number of bullets delivered by both guns and infantry, the former firing grape, I think it will be admitted that my statement is within the mark. Yet practical men did not propose to abolish our formations for combat on the grounds of the losses we there incurred, and it must be remembered that at the date of the Redan we possessed a considerable number of practical soldiers in our army, for, as Napoleon said, "Men age fast on the battle-field."

The question, therefore, only remains—What formation promises the best results?

All formations were tried, and, of the lot, line succeeded best; but the prejudice against the line was, and even is, extraordinary. The original conception, handed down from Napoleonic days, that the skirmisher protected the following column from loss, proved absolutely illusory.

It was proposed to increase the distances; then the skirmishers lacked support and momentum to carry them forward. So the skirmisher line was thickened till it became merely rank entire, and gradually the obedience to orders exacted killed the skirmisher proper and introduced the hybrid line.

This is the condition which still holds its own more or less all over Europe.

Instead of the true original skirmisher—the “verlorne haufe,” forlorn hope of former days—the man who scouted in front of the storming column, or the old *decision compelling* line, and who cleared the front or took his chance between the decisive fire fronts of the contending forces, we have now the man trained neither to know his own mind nor his officer's, and who can never be certain whether it is his right to die where he pleases or where his leader orders him. Could any system be more calculated to induce hesitancy in execution, which means the negation of discipline?

Let us reason it out first as a purely infantry question.

Given two contending forces and the hypothetical glacis-like slope.

The assailant comes under fire at 3,000—say 4,000—yds. How is he to continue his advance?

Would you immediately throw away all the cohesion which months of training, based on the experience literally of centuries, has given you, and tacitly let the reins go on the neck of the command?—say to them, in fact, “It is true I have been endeavouring to force my will on yours by the means and within the limits allowed by regulation, for the past two years or so; but now, in the presence of death and danger, I admit all my efforts were founded on error. From henceforth it is for you to decide as you like, and die as you please.”

Or would you not rather take up the reins, feel the bit, close your legs, and say to the men: “By deeds—not words—by right of the uniform I wear, and by the power I have exercised over you in peace, it is my duty to lead you in to the closest possible range, under the utmost possible control, and, irrespective of losses. I will carry you there. You shall die where I please, not where you may prefer”? And can there be any doubt which spirit in the leaders will carry the troops in furthest?

But it is not merely a question of getting the men *there*. The point is that, when they arrive at a certain distance fixed for you by the intensity of the enemy's fire, and the gradual deterioration of your own will (which, in proportion as you more or less command your men, is also their will), they should be able to open fire in reply, *simultaneously*, with every rifle bearing.

To keep the men in hand, the best formation is the column; but to develop the maximum fire power, that column must deploy, and deployment means loss of time at the most critical moment, with consequences familiar to all students of the Peninsula and Waterloo.

Is it not better to take the mean and employ the line?

For the regimental officer, everything hinges on bringing the men he personally commands up to the shortest possible range compatible

with controlled fire. That range need not necessarily be the final range, and, in so far, it is not the decisive one.

But *it is the* decisive one, in fact, notwithstanding, for if you do not attain the first fire superiority you will certainly never survive to reach the subsequent stages.

When you, in the first line, have reached that first limit of the fire contest your work is done. You can co-operate with others as long as your life remains, but the direction of the fight has passed from your hands, and all that remains for you is to do your duty in that station of life unto which it has pleased the D.A.G. of the British Army to call you. The responsibility for ultimate success, in so far as this first conflict has not decided it, now rests on the General and the arrangements that he, through his Staff, has made for your support.

If he possesses true battle genius—that indefinable gift of feeling the throbbing pulse of the immense fighting machine he controls, then at that precise moment when your strength was on the point of failing, and seconds would decide whether you turned and ran, your ear would have caught the beat of the drums, and if you turned the head your eyes would have seen the following line, closing always inward and presenting a front which no wavering will could possibly have faced. You would—you will—gain a psychologic impulse from its strength, and go forward with a cheer till the enemy's fire again calls a halt to your progress; and so on.

It is now a conflict between the battle instinct of the opposing leaders; all the individual, of whatever rank, can do is to back this genius by all the resolution at his command, and all any regulation can accomplish is to train and steer that resolution.

Resolution is will-power, and discipline is only a Latin name for the resultant will-power of thousands, willing the same purpose with all the strength of their natures; and the object of drill is to teach this will power, this sustained and concentrated effort of the mind, to control the muscles, both voluntary and involuntary, of the body; but to effect this the drill must be practised with smartness, and herein we have the scientific justification of the “cut away them hands there like lightning” of the drill sergeant.

One moment whilst I endeavour to develop this idea. In the old days when men went to the wars as regularly every summer as we now go to the manoeuvres, many things which are dark now to us were clear to them. Experience had taught them that in the few weeks at their disposal steadiness could not be overdone; if by chance it was, then the bullets of the next campaign soon restored the equilibrium. But when the conditions altered and war became the occasional—the very occasional—pursuit of the soldier, and peace his chronic employment, and as the experience of the battlefield ceased by lapse of time to influence the conduct of the drill-masters, this oversmartness became a positive danger, and, for one, I am not disposed to throw stones at those who twenty years ago revolted against the pedantry of the barrack square martinet, though I do think we have gone further than is wise in this direction, and that it

is the highest time that we copied the Germans again, and braced ourselves up.

If in the old days practical experience showed that the utmost possible strictness of discipline was needed to bring up troops to the limit of effective fire, and that only specially picked men could be trusted for the exceptional risks to which the skirmisher is exposed, then, if the deadliness of modern arms has increased to the extent inventors tell us, the need for the sternest discipline has intensified tenfold. Napoleon did not sanction the massing of men in heavy columns characteristic of his later campaigns, because that formation rendered them less vulnerable, but because it made the maintenance of control easier and he relied on the combined efforts of his artillery and cavalry to reduce the strain on the slower moving foot to the limits of the endurable. It was deterioration of material which led to this massing of men and not increase of fire power on the part of the infantry, but the point is purely a relative one, and it is immaterial whether the fire power increases and the quality of the men remains constant or *vice versa*.

I hold that the strain on the infantry, if properly handled, has not increased, but on the contrary has diminished, for the reasons broadly stated, that in the old days it took four Prussians a short day to kill one Frenchman, or *vice versa*, but in recent years six Prussians or Frenchmen working over the legal eight hours day have barely succeeded in accounting for one adversary. In the single instances in which the Prussians did come up to their old record of one to four, they took ten hours to do it, and the artillery committed most of the slaughter, and on the same day it took about eight Frenchmen the full ten hours to kill one German, though they never fought better.

There is a point at which improvement in weapons ceases to be an unmixed advantage. The weapon must be precisely adapted to the capabilities of the man, when this point is exceeded then what you want to do is to invent a new man, not a new weapon, and that is what the Germans and, indeed, our own new regulations intelligently applied are endeavouring to accomplish.

Normal evolution has in fact supplied us with a new man, relatively so as regards the era of Wellington, a being more nervous and possessed of greater individuality, which requires to be utilised. A rational system of military training endeavours to derive the utmost advantage from this increased individuality and to increase it also, by trusting the man more and educating him both to realise his position as a factor in the nation and to accept the responsibility inseparable from that position; he is no longer a machine, but a responsible being, and the greater his intelligence and the more it is cultivated, the greater the latitude he may, under certain circumstances, be accorded. At the same time his nervousness must be counteracted and a support found for the weaker vessels in the concentrated will-power which numbers and the habit of close-order drill smartly executed supplies him. There are armies in which these facts are not appreciated.

The two seemingly contradictory tendencies are both met by the same procedure. Training in extended order, &c., increases the intelligence and develops the will-power, and then the intelligence thus developed increases the power of willing together as a mass.

That intelligence alone will not suffice the history of the American War demonstrates. The men who ran at Bull Run were fully as intelligent as those who fought at Gettysburg—the sole distinction was that the latter had since been drilled.

Space and time prevent me from enlarging on the rôle of the cavalry, on smokeless powder, new rifles, and the shelter trench.

I must proceed to sum up the steps of my argument.

Given two armies equal in all other respects, except in the national conception attaching to the word "duty."

Then that army in which duty is most highly developed will be ready for action first, and to utilise the gain of time become the assailant.

By the time it reaches the enemy's position its *psychological* superiority will have sensibly risen, from causes already detailed.

If in the Napoleonic era "la morale est pour les trois quarts," then in these days of smokeless powder and long-range weapons it counts for more, and hence the chances of success are markedly the greater.

An incompetent commander may neutralize by his blunders the qualities of his troops, but these qualities, mainly the product of their national sense of duty, can extricate the commander, and, moreover, in proportion as the sense of duty is more or less developed in the race, the probabilities increase that incompetency will not be found in the higher ranks.

Finally, under existing conditions of society, and for many generations to come, duty and loyalty are practically synonymous terms. The average man requires a concrete symbol on which to concentrate his attention, and that symbol for us is and remains the Crown; and in the era of warfare which is inexorably moving towards us I venture to predict that victory in the long run will incline to that nation which has remained true to a monarchical form of government. Philosophers may reason about and sacrifice themselves for abstractions, even for Humanity with a capital H, but the rank and file of the nation requires something more tangible.

Colonel LONSDALE HALE: The lecture may be divided into two parts, the one interesting but abstract, the other practical and concrete. An account of 10 army corps fighting on 20 miles with 20 miles of batteries is very interesting, but of no practical importance whatever to Englishmen. The lecturer has come here apparently to assault the old system of tactics which has been applied from time immemorial by the British Army, namely, defensive tactics, and if his view of defensive tactics is correct, let us disband the British Army. Our army is not large enough to engage in a Continental war on the offensive, in the face of modern fire-arms, but some day we may have to defend this country, and what is the good of pretending to defend it if Captain Maude's view of the attack is correct: batteries opening an overwhelming fire on the force, and under cover of the confusion out-galloping the corps batteries and going into action at a thousand yards? Under those circumstances everybody must go. As to the terrible effect on men's nerves

of shells bursting, a good deal seems to depend upon whether the shell that bursts hits anybody or not, as instanced by the endurance of the German garrison of the cemetery of Beaune-la-Rolande under the convergent fire of 30 French guns. With regard to the instance of the battery at Gravelotte, the successful holding on of this battery may be counterbalanced by the retirement of the horse artillery battery of the 6th Cavalry Division from infantry fire at 1,200 paces at the battle two days previous. The lecturer has brought the infantry up to 600 yds. away from a position, but neither he nor any one, to my knowledge, has told us how, in the face of modern fire of magazine rifles and Maxim guns, you are going to get over that 600 yds.; that is the point in which we who believe in the defensive maintain that the difficulty of the attack lies. With regard to St. Privat, some of the statistics brought forward by Captain Maude this afternoon are not in his printed lecture, and are new to me, but I went very carefully into the statistics last night, and I find there were 15,000 men, and not 12,000, employed in the assault at St. Privat, and I believe that those 15,000 men lost 5,000 in the assault. Captain Maude says that 10 per cent. were lost in the first onset, but I know of no grounds for so low an estimate.¹ Afterwards in the village there was comparatively little

¹ In the controversy which has arisen between the lecturer and myself on the losses incurred by the Germans in the attacks of the 16th and 18th of August, 1870, we are neither of us actuated by the petty wish to get the better of each other. Both of us have studied closely these episodes of the war, and have in common the desire to get at the true facts of the two instances adduced by the lecturer in support of the views he put forward. And only those who like us give their attention to the details of modern battles can realize the difficulty of approaching the truth even approximately. It is only the superficial students of modern battles who do not amicably agree to differ in their conclusions. Since the delivery of the lecture, the lecturer has courteously sent me a printed proof of his reply to the remarks I made in the subsequent discussion, and the purpose of this note is to give the authorities on whom I rely for my dissent from the estimate of losses in the advance and attack arrived at by the lecturer.

1. As regards the attack by v. Wedell's Brigade towards the ravine N.E. of Mars-la-Tour on the 16th of August.

At p. 84 of the Regimental History of the 57th Regiment, written by First Lieutenant v. Schimmelmann I, and published in 1883. The loss incurred in the advance up to the ravine is described as "enorm," and at p. 85 the subsequent retirement of the regiment is spoken of as "ausserordentlich verlustreich." The historian at p. 89 attributes the great loss mainly to the ground, so unfavourable to the attack and so favourable for the effect of the defenders' fire; to the superiority of the defenders in numbers, and generally to their better armament ("Die grossen Verluste des Regiments erklären sich hauptsächlich aus dem Angreifer sehr unvorteilhafter und für die feindliche Feuerwirkung günstigen Terrain, aus der grossen Überlegenheit des Gegners an Zahl und siener besseren Bewaffnung"). In the year 1882 had appeared an anonymous work, "Zwei Brigaden," the writer being Captain Fritz Hoenig, who had been adjutant to the 1st battalion of the 57th regiment during the battle. At p. 96 Hoenig states, "We shall be right in assuming that half the loss was incurred in the retreat" ("Man geht wohl richtig, wenn man annimmt, dass die Hälfte unserer Verluste auf den Rückzug fällt"). Consequently the advance and attack were responsible for 50 per cent. But later on, in 1890, Captain Hoenig published another work, "Untersuchung über die Taktik d'r Zukunft," which is a development of his first book. At p. 133, Hoenig reiterates his estimate of the losses 50 per cent. in attack, 50 per cent. in retreat. At p. 117 he says that the men threw themselves down at 100 m. south of the ravine, and that "God himself" could not have made them go forward under such a fire over open ground and exhausted morally and physically. At p. 88 of the "Zwei Brigaden" Hoenig says that this attack affords us data to arrive at a decision whether such ground can be traversed by troops attacking without their becoming incapable of further action. In this book he gives no decided opinion on the matter, but by 1890 he had arrived at a conclusion, and at p. 128 of

fighting. I believe that it was in the first advance that the men were decimated, and they only got over the 600 yds. afterwards after an enormous circle of between 200 and 300 guns had thoroughly crushed the defence. The breakdown of the defence was owing to the circle of artillery fire, the failure of ammunition, and the men on the defence being exhausted. Captain Maude says that against these 15,000 Guards there were 20,000 French. From this estimate I differ, thinking it far too high. Then as to the other illustration that he gives us, that of the "ravine." It seems to me that this instance helped us on the defence very much. He says, however, that only 15 per cent. were lost in the advance.

Captain MAUDE: Most of them.

Colonel HALE: That was the point, 15 per cent. The regimental history of the 57th Regiment does not seem to support the lecturer's calculations. When the regiment arrived at the edge of the ravine they were only 200 yds. away from the French; they had in front of them most excellent cover, and could have run right down and been absolutely sheltered. It would have been the natural impulse of the regiment to go down into the ravine to get under cover, and there prepare for the assault, but they were exhausted and could not move. The fusilier battalion went forward, and could only go forward in completely extended order, and yet, notwithstanding this, the centre zugs out of 10 zugs that went forward were absolutely annihilated by this tremendous fire from the other side of the ravine, and I find the losses of these two companies to which he refers were 130 and 144 respectively. Now, the 57th had lost a large number when suddenly the French burst out on them, and it became a hand to hand fight on this side of the ravine.¹ The regimental historian says the exhaustion of the regiment was due to the enormous losses in going over the open ground up to the ravine itself. Undoubtedly the 16th Regiment did manage, owing to more favourable ground, to hold on, but it had to come back owing to the terrific fire. This was within my 600 yds. I refer once more to the battle of Beaune-la-Rolande, when this rush had to be made, the

his "Taktik der Zukunft," his opinion is thus recorded: "I think it is impossible, even in extended order" ("Ich glaube es nicht, auch nicht mit Anwendung von Schwärmen").

2. As regards the attack on St. Privat on the 18th August by v. Pape's Division of the Prussian Guard on the north side and v. Budritski's Division of the Prussian Guard on the south side of the St. Marie—St. Privat road.

I find that 15,000 men attacked the west front of St. Privat, and that the loss of these 15,000 was 30 per cent. The lecturer contends that in the first advance the loss was only 10 per cent. of this loss only, but I regret that neither my own "common sense" nor my "reason" justify me in accepting this percentage nor the "8½ hours under fire" he specifies in his lecture. He, in his reply, referred me to Prince Kraft's "Letters on Infantry." I have consulted it, and though the exact reference he gave has escaped my search, I find in the 10th letter Prince Kraft's opinion on the slaughter in this attack. He says: "The day after the battle, which lasted till after dark, I found many of our dead and wounded foot soldiers scattered over the whole space between St. Marie and St. Privat; these symptoms of deadly combat becoming more and more pronounced the more you approached the latter place, till within 500 or 600 paces of it, when the bodies lay close together in rows, forming a complete semicircle round it, but nearer to it there were but few. Some of my infantry comrades argued from this that the French rifle was sighted too high, and thus fired over our men's heads at close quarters. But the real reason was rather that our soldiers suffered most on the ground where they halted the longest to return the enemy's fire, which had almost entirely ceased when the assailants chose that favourable moment to make the last rush." There is, as I am sure the lecturer is aware, a great amount of testimony corroborative of the opinion held by Prince Kraft, and I shall have to wait a long time before I can force either my reason or my common sense to differ from it.—L. A. H.

¹ Hoenig, at p. 129 of his "Untersuchung über die Taktik der Infanterie," states, however, that this battalion advanced not in extended order but in close formation.—L. A. H.

Germans were very few in number and the French very numerous. The Germans were under the most complete discipline. They were told not to fire in the first case up to 500 or 600 paces ; later on the firing was reserved up to 150 or 200 paces, and I ask again how are you to cross that space ?

Captain JAMES : I should like to say a few words on the subject of the lecture this afternoon, and I am afraid I am going to pose as a friend of Captain Maude, notwithstanding the attack of my defensive friend, Colonel Hale. I am not at all inclined to admit that either history or a knowledge of the English Army would lead us to adopt the defensive, whether it be in allied operations on the Continent or in fighting in England. I cannot forget that a good many of our great victories on the Continent have been fought as offensive battles, and with some measure of success. I am the more free to take this view of the value of the offensive, because it seems to me the lecturer is somewhat in the position of the unfortunate defensive ; that is to say, with the system which obtains at this Institution of circulating the copies of the lecture beforehand—he does not know in the least where the offensive is going to concentrate its force against him ; and he may be in the unfortunate position of the General who massed his reserves on one flank whilst the attack was directed against the other. I hold that the advantages of the attack have been proved by a far larger number of instances than the advantages of the pure defensive, or the offensive-defensive. I think the tendency of the improvement of weapons is to render the value of the attack even greater than in former years. The attack has the power of the initiative. You are on the defensive. You do not know what point you are going to be attacked at. You suffer therefore from one of the greatest of the factors which go to determine the issue of all battles, viz., the unknown. You are on the defensive. You do not know what is going to be done against you, and in these days when weapons have increased so enormously in value, when it is now possible to kill a very large number of men in much shorter space of time than it was formerly, the power of the initiative is enormously increased, and this to my mind is one of the great reasons why the attacking is always the strong side. Moreover, I would point out that even in a prize fight the man who acts purely on the defensive can at least not hope to obtain a very decisive victory. If you are to act on the defensive, you postulate the offensive-defensive—Wellington's great system. Suppose you are acting on the defensive, and the moment comes when you determine to assume the offensive, you are not exactly at handy strokes with your enemy, but a certain distance intervenes between you ; the attacking force may be 600 or 800 or 300 yds., but whatever it may be the moment you assume the offensive from the defensive you convert the attacking force into the defensive, and they themselves have to act on the defensive against you, i.e., whether on the offensive or defensive, victory is ultimately gained by the final threat to come to close quarters with the bayonet. Therefore, it seems to me this problem of passing over the last few hundred yards of shot-swept space is one which affects both sides alike, and therefore it seems to me on the whole the offensive is the more advantageous rôle to play. I should like to ask Captain Maude one question, and I hope he will not think I am carping in doing so. He said that guns and infantry cannot be in the same line. I am going to ask how are you going to act in Northern Italy where you have no range, and where it is all as flat as this table. There is no range, and the mulberry trees obscure the view. The ground is cut up by watercourses, it would be impossible to deploy long lines of guns, and it seems to me the fighting line in modern days, as in the old days, in this part of the world will embrace both infantry and artillery. Again, in battles in wooded countries the same thing will happen as in the fighting in the wilderness in the American War. One point which I should like to mention has struck me very much with regard to close fighting in reading the regimental history of those regiments which took part in the attack of St. Privat, particulars being given which are not found in the official account. If you read those histories you will find that the final attack on the village, which after all in itself was a small point, and on which it was quite impossible, as Colonel Hale says, to put 20,000 men unless you piled them one on the top of another—the actual attack was carried out by small numbers. A lot of those who had not been killed and wounded, I venture to suggest, lay down in the advance, and although they rallied to the colours next day,

when the fighting was going on they were not taking part in the forefront of the battle. There is a very curious point about the line formation for infantry. The line has always been condemned by foreign military authorities, although of late there has been rather a tendency perhaps to come over to our view on the matter. Linear tactics obtained all over Europe from the days of Frederick, the French Revolution, and we were the first to see that the third rank was useless, and thereby extend the length of the line and increase its fire value. But there is still a doubting tendency on the Continent as to the value of the line formation. I remember in reading how Von Moltke, in his book on the "Influence of Firearms," describes the attack of the British troops at Alma, and the terrible effects the rifles had on the Russian regiments when they endeavoured to turn out the heterogeneous mob of men that had taken the so-called redoubt. He points out how the Russians were in a dense column, and how nearly all the officers fell and the heavy casualties which occurred, and yet he goes on to deduce from all this that the column was on the whole better than the line. No doubt, what we may call the barrack square line is a thing of the past. It is impossible to march in a two-deep line over a large extent of ground, but it does not at all follow that you cannot march a single rank line in sections—I do not use this word in the infantry drill sense, but as meaning portions—over any country in which fighting may take place. Of course the barrack square element in its proper place is a very valuable one, inasmuch as it is the foundation of all discipline. But it is a dangerous thing to allow men to lead who have no ideas beyond the barrack square. I was reading an account of the battle of Leswarree a short time ago, which was a very curious example of that. An English regiment marched to the attack, and they came up so that their rear rank was in front. In those days there was no change ranks, and when they were within about 50 yds. of the enemy's line the companies counter-marched by ranks. There are many gentlemen in this room who are old enough to remember the old manoeuvre "Ranks right and left face; right counter-march," and they went about under the fire of the guns of the enemy in the front of them. If they had adopted the idea of General Hawley, who said "that the 60th had no rear" it would have been far better fitted to the occasion. Lastly, may I say that I think we in England are too apt to take all our ideas from the Continent? We do not bear in mind national tradition. Our national tradition is the line, and it seems a much more reasonable course for us to set to work to find a solution of the best way of manoeuvring the British line than to take the ideas of foreigners, who have always been opposed to this method of proceeding.

Colonel HENDERSON: The very able speech we have just heard has anticipated almost every remark I intended to offer. I should like, however, to emphasise Captain James's attitude towards Colonel Hale's statement that the British army is traditionally bound to the defensive. If we look at the colours of our battalions and count up how many of the victories recorded thereon were defensive battles, we find that the contrary is the case. It may be urged that the majority of these victories were won against either savages or semi-civilized enemies, and that, consequently, our tactics were naturally of an aggressive nature. But if we confine ourselves to the European battles alone, beginning with the War of Secession, how many of famous victories were won on the defensive? Very few indeed. History tells us, I think, that English Generals, like those of other nations, have only fought on the defensive when it was impossible for them to take the initiative and attack. I cannot recall an instance where an English General, who had a fair choice between offensive and defensive, deliberately selected the latter. Wellington certainly never did. If you read Napier and the despatches carefully, you will see that the reason is generally stated why the Duke was so often compelled to surrender the initiative to his adversary. There is a point here which may be interesting. In the era of Brown Bess, cavalry had more effect than it has now, or, at all events, it was more dreaded. No General, therefore, who was weak in cavalry dared act offensively. His first idea was to get in a position where he could be safe from the enemy's horsemen. At Fuentes d'Onor, Wellington's cavalry were few and inefficient. The French, on the other hand, had been strongly reinforced in this arm, and their squadrons were in good condition. The Duke himself states in his despatches that it was for this reason that he refrained from attacking the

French whilst they were on the march to relieve Almeida. Lastly, as regards this question of our traditional tactics, it has been often pointed out that, as a matter of fact, Wellington fought more offensive than defensive actions. To turn to the 1870 war and the lecturer's deductions. Colonel Hale suggests that it was impossible to put 15,000 rifles into line against the advance of the Prussian Guard. But it is to be remembered that the French battalions were not only posted in St. Privat village, but were deployed over a wide front, something more than a mile in width, and they were especially thick to the south of St. Privat, between that village and Amanvilliers.

Colonel HALE : I am talking of the 15,000 said to be at St. Privat. There were other troops attacking Amanvilliers. There were 15,000 men moving on St. Privat, and what I ask is, where were the 15,000 to meet them?

Colonel HENDERSON : When I say that there were 15,000 French rifles ready to meet the Prussian Guard,¹ I am not referring to Amanvilliers at all, but to that portion of the position on either side of St. Privat, which the bulk of the Guard corps attacked. I may add, before I sit down, that I think there is always great danger in a time of profound peace that moral force, to which the lecturer has alluded, may come to be underrated. This moral force is little apparent at peace manoeuvres and altogether absent at the butts, but it is to be remembered that, even in these days of magazine rifles and machine guns, this force is to material force as three is to one. The difficulty of getting over the last 600 yds. is no new one. A recent paper in the United Service Journal quotes records of some long-forgotten campaigns, fought when fire-arms were by no means effective, which show that it existed even then. In the days referred to, the question of the relative advantages of the offensive and defensive was practically commented upon as follows : When one General took up a defensive position and entrenched himself, his adversary advanced, reconnoitred, and went home! But still, at a later period, as Captain James has remarked, this very difficulty was overcome, and it was overcome by the same methods as it will be overcome in the future, by establishing fire superiority and by demoralising the enemy so that he cannot shoot straight. When this has been done I don't think that the magazine rifle and machine gun will stop the rush. No one, I presume, will be bold enough to advocate that this rush should be made before superiority of fire is established ; and when it has been established I don't think the formation in which the last few hundred yards are traversed will make much odds. At all events, no formation which can be devised will get troops over the decisive zone without they have first thoroughly demoralized the defence.

Colonel DOONER : The one point on which I would venture to offer any remarks, and to which I would ask the lecturer to particularly refer to in his reply, is to make quite clear to us how the difficulty which the last speaker mentioned is to be surmounted, viz., how is that final 500 or 600 yds. to be passed over. I think, however, it will not be quite fair when dealing with the defensive to assume that the guns are withdrawn and placed in reserve, as we see is mentioned by the lecturer; neither will it be quite accurate to conclude that the defending General takes up his position and constructs his shelter trenches in the way they are constructed in some of those drawings. Especially in Drawing III, which was the one the lecturer referred to as rather important, and in which he said the supports could not be possibly brought down to reinforce the firing line. I think no one would place their shelter trenches so far down from the crest as is there shown. Then, again, in the lecture I observe it is assumed that 20 per cent. of the defending line have been killed or placed *hors de combat*, and therefore there are only 80 per cent. left. That appears to me a rather astonishing conclusion to arrive at, because why are small supports put behind the firing line ? Surely to support and reinforce

¹ I by no means wish to suggest that the whole of these 15,000 rifles were in the firing line from the very first. But there were 15,000 rifles available with which to shoot down the Prussian Guard, and probably nearly 20,000 ; the firing line which this force furnished was stronger, I believe, than that of the Guard, and it could be much more easily reinforced and maintained at full strength.

it in case of casualties. If any of us were placed in command of 800 or 1,200 yds. of front we should not be content, I imagine, with putting one line in single rank all along that front and no supports under cover and close at hand. I do not, therefore, think it is quite fair, in order to improve his argument, that the lecturer in his calculations should assume that 80 per cent. only of the defending line are left, because, of course, the wounded and killed would be replaced at once or as soon as possible. I think Colonel Lonsdale Hale anticipated everything I was going to say about the defensive, and I still am of opinion that the defensive possesses great advantages, if not superiority, over the offensive. I will grant Captain Maude all the usual points claimed in favour of the attack—the moral advantage, the attacker having the power of choosing his point of attack, the wounded being left behind, the offensive fire being convergent, and all the points that are usually urged and which I cannot at this moment call to mind; but I still say, how are you to get over the last 500 yds.? I will grant the lecturer that his attacking line has come within even 300 yds., quite close, and I will not ask him in getting there to lose 15 per cent., as he says, because I think by judicious handling of his men he may get within 500 or 600 yds., or less, and perhaps not lose 15 per cent.; the loss will probably depend on the ground passed over. Was it not proved at Plevna, where the Turks laid down behind their entrenchments and remained there in comparative safety while the artillery fire was going on, but the moment the fire ceased, and this preparatory fire must cease when the infantry begins to advance and mask the artillery fire, then I say what is to be done? As the Turks did, the defenders will man their parapets and entrenchments, and pour in a murderous fire; and I should like Captain Maude, in his reply, to kindly tell us how this fire-swept zone is to be passed over.

Colonel TROTTER: As the officers who have spoken have touched on all the important points, I feel there is little for me to say, but I think Captain Maude in his lecture rather leaves the impression on our minds that Commander A, who is defending, is not quite so well up to his work as Commander B, for you will notice that when B took up his position and made the *épaulements* he does not seem to have realized the faultiness of his position and, consequently, the enemy was able to attack at a point where they were not expected; but this is only a passing remark. Captain Maude states he considers it necessary that all our men should be taught to drill smartly, and I am glad to understand from that that he wishes steady drill to be inculcated into all our recruits. I am strongly of impression that no man would be able to pass over the last 600 paces and control his fire unless he had been taught steady barrack-yard drill when he first joined as a recruit. I will now ask Captain Maude to reply.

Captain MAUDE: Captain James has already replied almost as completely as I can to Colonel Hale's objections, but I will make one or two remarks. I did not come here to talk of tactics as limited to the British Army at all; I am talking about tactics as they refer to the world at large—the tactics of great armies, and if we are not a great army, the sooner we become one the better. I want to know why 20 corps or 10 corps should not be employed together; and as for the corps artillery galloping through the infantry with smokeless powder, there is no reason why they should not. They habitually practise it in manoeuvres, and why not do it in war. With regard to Beaune-la-Rolande Colonel Hale tells us there were 30 French guns, but he does not say what kind of guns. I believe at Cressy some of our guns fired a long time without hurting the French; but, to compare these guns with the artillery of to-day, you might as well compare them at once with the cross-bows of the Crusaders. Then it is said the artillery have to cease firing. They only cease for a few moments while the others get through; they keep up their fire to the last. Towards the close of the action when the enemy's fire is totally wild then the guns come forward, and then their case-fire tells. It has been done again and again, and I do not know why it should not be done now. The whole point is which is the thing, the man or the weapon? The man and the weapon go together. If the man's hand shakes, there is an end of it. Then comes the old story of the last 600 yds. If Colonel Hale will refer to Hohenlohe's letters on infantry, Hohenlohe tells us he was standing by the side of one of the corps commanders during the time the Prussian infantry lay out in a long

line with the guns firing over their heads. It lasted about two hours, and suddenly Hohenlohe snatched up his telescope and turned round to the other man and said, "Now is your time!" The other man said the same words to him almost at the exact instant, and before they could give the word or order, the line felt it was their time, and went for the enemy. The fact is, when once superiority of fire is obtained, one side must go forward and the other give way. That is what is meant by fire superiority. That is what has happened, and I presume will infallibly happen again. As for the 30 per cent., I said 10 per cent. in the rush, and that is the best I can make of it. As regards the 15,000 men, if it is in the official account, I cannot contradict it; but as it seemed to me that 12 battalions went into action, I took them at 1,000 each in round numbers, which is less than the actual number. Then as regards the 15,000 French—

Colonel HALE : 20,000.

Captain MAUDE : I read 15,000. I do not suppose for one minute they crammed them all on together, but I did mean they were standing in a strong formation—several lines. When I wrote the 20,000 I took into account the overlap on the other side of the road; I afterwards corrected that and put 15,000. It was equally impossible for the 15,000 Prussians to use their rifles, and probably not one-half ever attempted to. In this particular sketch the dotted line was the track ridden by Hoenig. He rode as adjutant in the centre of the line where he could see everything. He wrote this book after the regimental and official histories and in correspondence with the others, and quarrelled with one or two of their authors; but he states as a solid piece of evidence that he saw distinctly these companies in line firing volleys, and I assume he spoke the truth. I do not see why he should not. I fancy there was a great deal got into print which would not bear very close examination, and Hoenig was the man who has been showing it up. I have asked dozens of officers of every rank in the Prussian Army what they think of this book, and I have discussed it with them night after night, and nobody contradicts his facts. They may question whether it was advisable to write it, but they do not question the facts. As regards running into that ravine to shoot. They did not want shelter, there would have been no sense in running in there, because they could not have seen to shoot. They could not begin to shoot till they got to the edge of the ravine, because the rifles would not carry far enough. The whole point turns on the inequality of arms. All the trouble that they had was simply and solely due to the fact that the Prussian rifle would not carry half-way, and that had to be allowed for. We always assumed the arms to be equal, and all the confusion in our tactical ideas owes its origin to this false assumption. As regards covering the last 600 yds., the "psychological" impulse, if you like the word, comes on the troops, and they seize it. I am much obliged to Captain James for so ably standing up for me. He has answered everything, and I can say nothing more except about the guns and infantry in the same line. The same trouble occurs in India, still the attacking side has the power of obtaining the superiority of fire; they will lose many more men than otherwise, but you have to take that into account. The origin of our line came directly from the Prussian drill book. It is a translation. Another thing that may be worth noting, the French Drill Book, under which they went through the Great Revolutionary Wars, was a translated copy of the edition which appeared in Brunswick about 1787, and evidently they fought in line then, or that, at least, was their intention. The whole point of line I take it is covered by the definition I give here: the line is not line because it is rigidly dressed, but because its main object is to kill without any reference to whether the men get killed themselves, to inflict loss, not to shirk it. The skirmisher is a man who inflicts loss and does the best not to get hit himself. That is totally different. I cannot help thinking if you turn over the pages of our earlier drill books you might find that we were ahead of Germany in 1870; we should have fought in line, and I do not think we should have had the same trouble. Colonel Henderson I beg to thank most sincerely for having stood by me. With reference to Colonel Dooner's remarks, the position of the shelter trenches is fixed by a variety of considerations that only come into play when dealing with mixed forces, and in No. III the necessity of sweeping the ground over which the enemy has to advance necessitates the occupation of the

break of the slope. I do not know how field fortification is taught now, things change so rapidly, but during the 20 years I served in the Royal Engineers we always laid great stress on a clear field of fire. With regard to the defenders' guns, I said that the guns must either be withdrawn or left where they are, and if any other conceivable move is open to them under the present material conditions which make up our environment I shall be glad to have it explained to me. Finally, as regards Plevna. Here I can cordially agree with the defenders of the defensive. Given attacking forces, handled as the Russians handled theirs, and I will cheerfully prophesy victory to their favourite method, but I have not proposed to you to employ my attacking troops in that fashion and do not intend to.

The CHAIRMAN : I am sure you will allow me to return your thanks to Captain Maude for his very able lecture.

NOTE.—In reply to Colonel Hale's note. With regard to the 38th Brigade, Colonel Hale has misunderstood my argument. It is perfectly true that no power on earth could have carried the men beyond the limit they actually reached. They were morally and physically exhausted owing to a combination of circumstances with which we have nothing to do. My reasoning was, and remains, if under the circumstances of the moment as they existed, and in face of a given quantity of death-dealing projectiles to be encountered, the brigade succeeded in making good its advance to a point well within effective range, then the same feat can be performed again by troops less exhausted and better handled. Their fire will tell more the greater the control and the shorter the range, and covered by it a second line can reinforce with less loss, and a third one with less still, so that, given adequate arrangements on the part of the Staff, the attainment of ultimate fire superiority is a certainty. Once that fire superiority is attained, and in proportion to the degree in which it is attained, the details of the assault regulate themselves and cease to be of practical importance. Thus, if the superiority obtained was so complete that no one was left alive on the defenders' side, it would be quite immaterial whether troops marched to the assault in mass of columns or in line. It is not, of course, likely that the degree of superiority will ever attain this extreme limit, but in proportion as this limit is approximated to, the ultimate advance will be made easier. With regard to St. Privat, it is quite immaterial whether 15,000 men or 12,000 men were put in against the village; the sole point is the percentage of loss, viz., 30 per cent., and on this we are agreed. Colonel Hale then accuses me of stating that one-tenth only of this 30 per cent. loss was suffered in the first rush, i.e., up to the moment at which the forward impulse died out, but this is not what I said at all. My statement was that one-third of 30 per cent., i.e., 10 per cent. of the whole number engaged, fell in the first rush, and his quotation, which is not the one to which I referred, bears me out, for the dead lay thickest where the Prussians halted longest. The rush occupied, at the outside, 30 minutes of time, the halt, at the lowest, 1 hour 30 minutes; practice is usually better at short ranges against stationary targets than at long ranges against moving ones; but assuming the rate to be constant and ignoring all the men who fell subsequently to the final advance, my 10 per cent. is over, not under, the mark.

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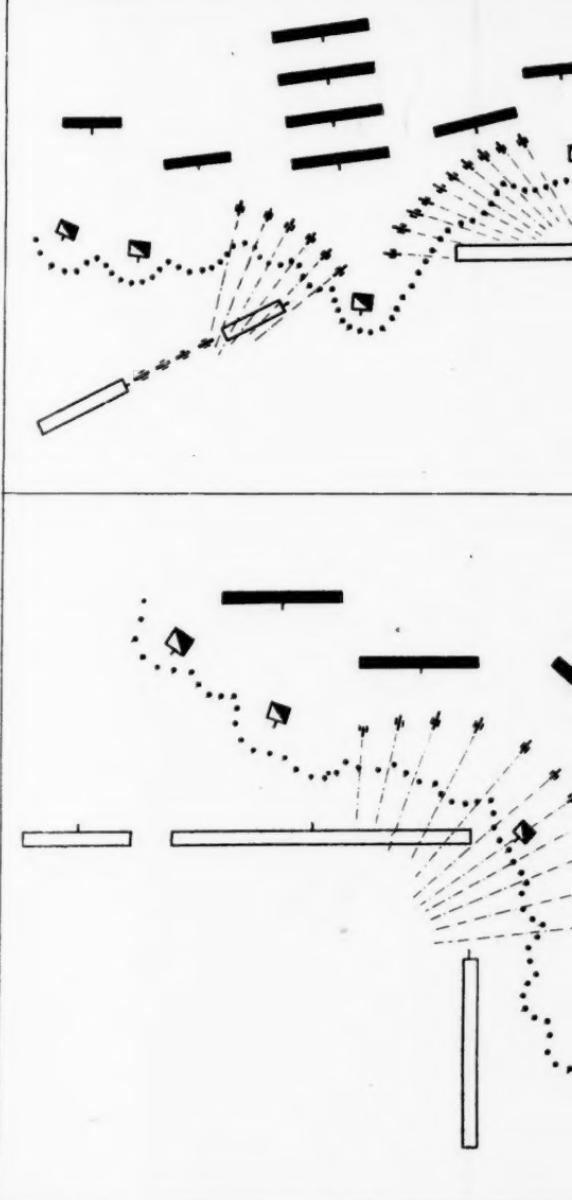


Fig. 1.

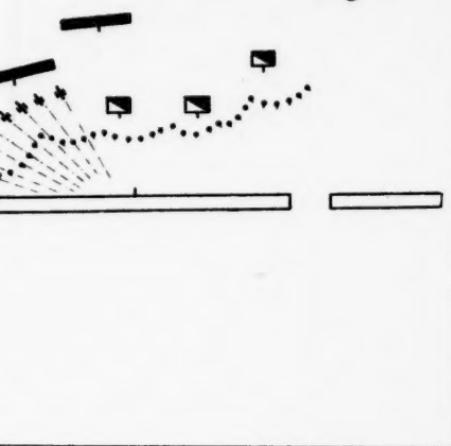
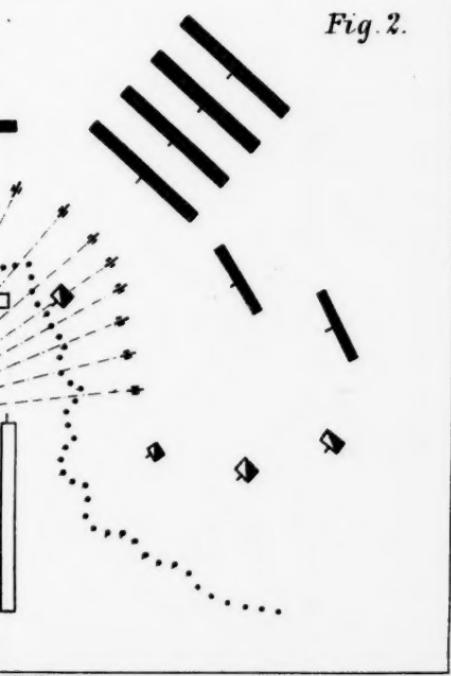


Fig. 2.



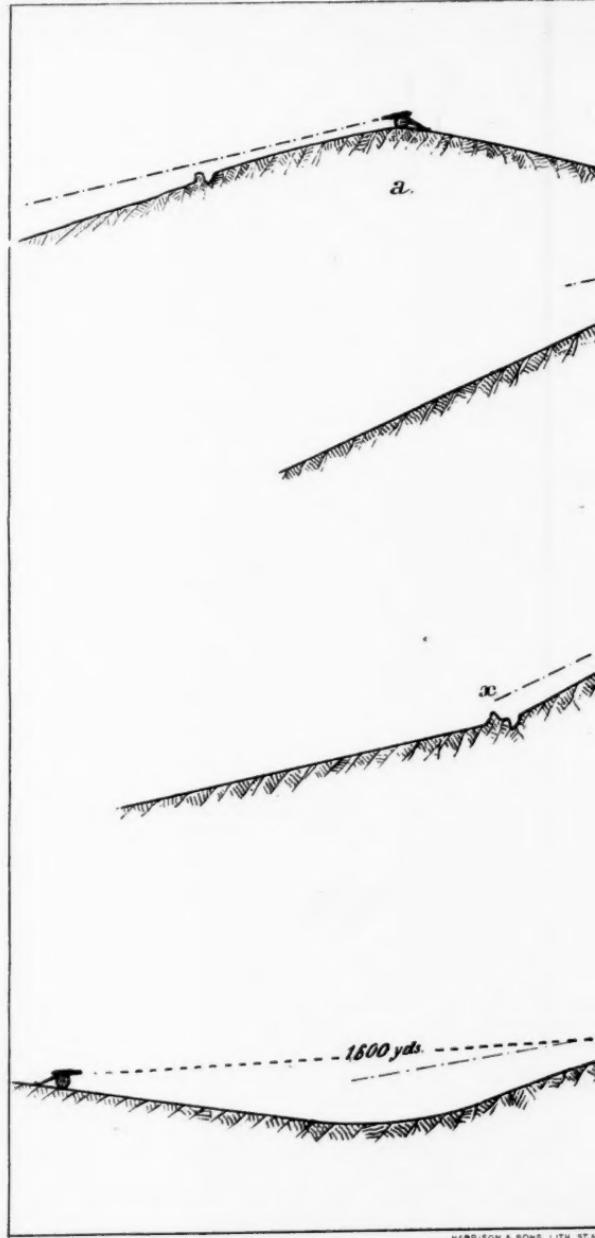
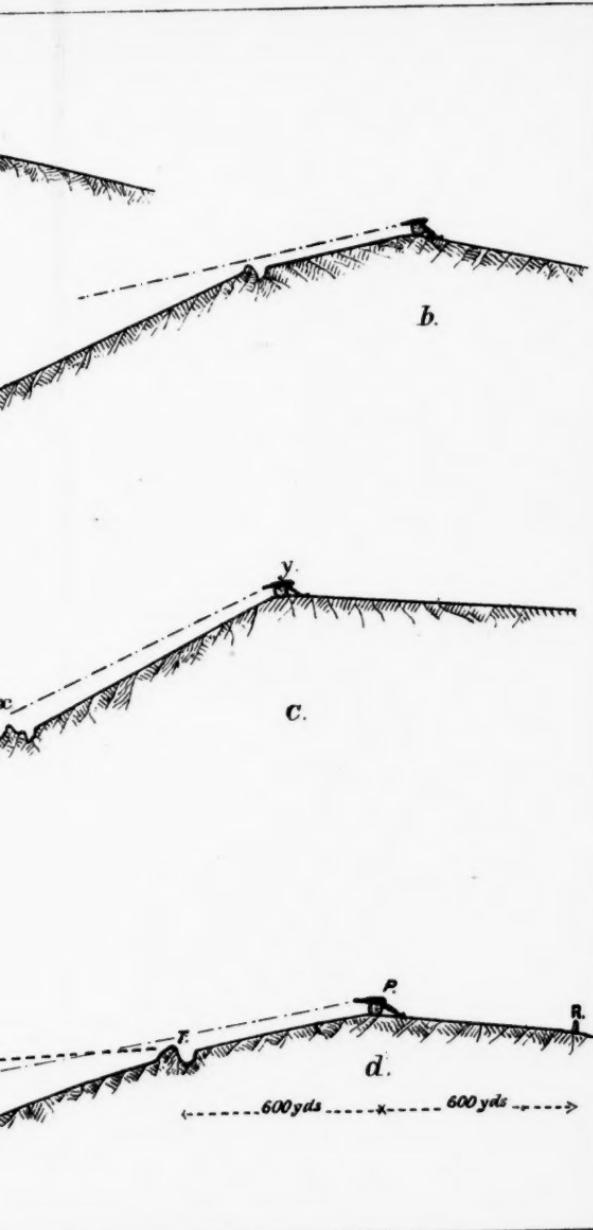


Plate 36.



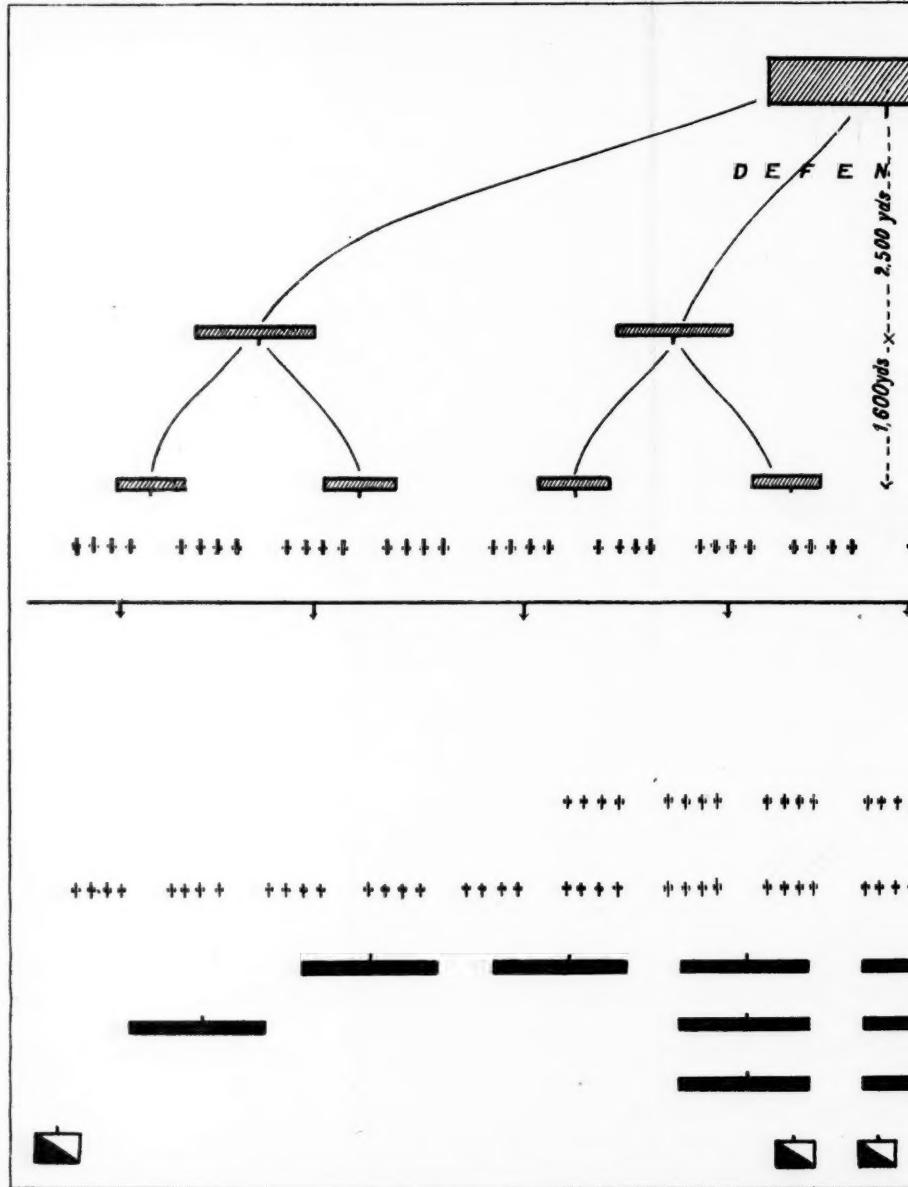
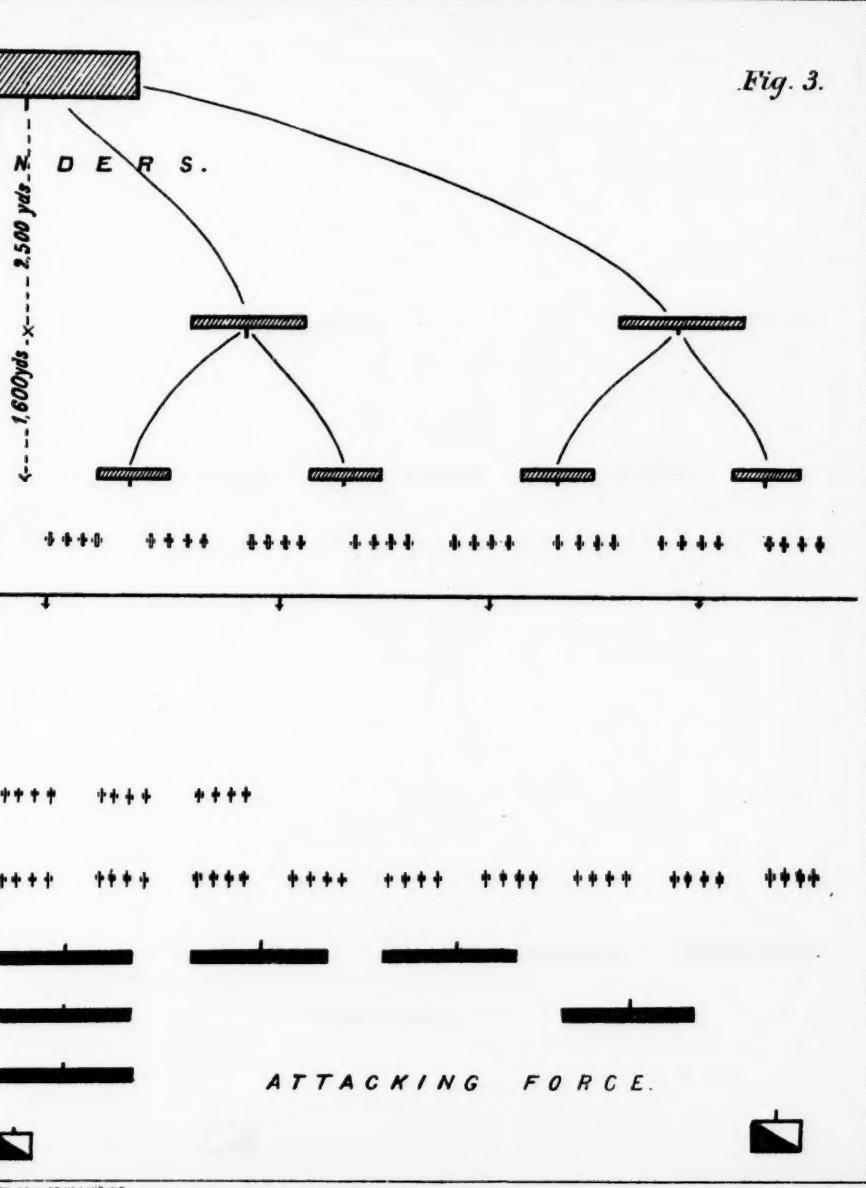


Fig. 3.



18th April,

LIEUT.-GENERAL GRANT, R.E., C.B., Inspector-General of Fortifications, in the Chair.

STEAM TRANSPORT ON ROADS.

By Lieut.-Col. TEMPLER.

THE difficulty in collecting horses in sufficient numbers for the mobilization of an army at short notice from home sources has undoubtedly been the chief reason for the trial of road locomotives.

"Nowadays, rapid mobilization has become a vital necessity," and to effect this, road engines must be called into use for the transport of matériel of all kinds on the lines of communication.

A single road engine will perform the labour of several teams, and at a lower cost; hence it is that the use of road engines by the European Governments is becoming general.

Of the efficiency and economy of transport by road engines there can now be no doubt, as the rapid increase in the demand proves.

It is estimated that there are 22,000 miles of turnpike road in this country, and this great length of road is being brought under the dominion of King Steam, and there are already 8,000 road engines upon it owned by commercial men, who have saved large sums of money by adopting them. This application of locomotive steam power to common roads was a work of no ordinary cost and difficulty. It was necessary to solve the mechanical problem of designing and building an engine strong enough to stand the rough jolting of our rough roads, simple enough to be understood and managed by an unskilled man of ordinary intelligence, and practical enough to be encouraged as a most economical assistant to, or substitute for, the always costly and increasingly costly horse. All these conditions have been fulfilled by the manufacturers, and yet we are slow to take advantage of such valuable help.

That our legislators anticipated the general use of road engines may be seen by the preamble to the Act of Parliament regulating the use of locomotives on common roads, which runs thus:—

"Whereas the use of locomotives is likely to become common on turnpike and other roads," &c.

If these engines can be worked with economy and advantage by civilians, why not by the army?

I know that it is a Herculean task to interfere with, or to disturb established or existing systems; nevertheless, "the right nail is sometimes hit on the head, provided some are hammers." The nails I am hammering at are, I am convinced, very important ones to hold

together the framework of our transport service, and I hope to succeed in hitting them on the head.

A quarter of a century has elapsed since Steam Sapper No. 1 was built by Messrs. Aveling and Porter, and a Committee of the Royal Engineers, consisting of Colonel Wray and Colonel Lennox, C.B., with Colonel Gallwey as President, and Captain Horne as Secretary, made a trial of it. From that time to this no adverse report has ever been made by the Royal Engineers, but an additional engine has been bought every year since that trial.

Le Général Lewal says, in "Études de Guerre":—

"Experiments were made last October ('93) with some of the steam sappers used in civil employment about Paris. A speed of 20 kilom. an hour was easily reached."

The mobility conferred on an army, the trains of which can move at 7 miles an hour, and can march day and night must be evident.

You get rid of your endless trains of requisitioned wagons, and can without any injury keep the heads of the trains outside your zone of operations. At present a train of wagons can on the best roads only traverse 15–20 miles daily, while a traction engine would in the same time reel off 60 to 75 miles. And how simple would be the escorts! A Maxim on the engine, and any cavalry detachment would be powerless against the train.

I would even use them as a means of speedily transmitting officers from one point of theatre of war to the other.

Captain Stella Sabino, of the Italian Army, reports:—

"It is a fact that road engines may become exceedingly useful in the second and third lines for the service of victualling, of ambulances, of bridge equipages, artillery parks, and of the engineers, &c., relieving us thus from the necessity of enlisting a civil train, and of seeking abroad for horses every time a rumour of war springs up. With the locomotives, the encumbrance of the convoys is reduced to one-third, and to one-third the number of combatants that would have to be withdrawn on the field of battle for such convoys."

In an official report on the employment of road engines in the Russian Army, Victor Demianowitch, Colonel d'État-Major Général à Saint Petersbourg (Département du Mouvement des Troupes), says:—

"The road engines, although only a part of them were employed, and then very interruptedly and irregularly, did not only completely reimburse their purchase money and the cost of maintenance, but brought an actual profit."

He concludes:—

"The road engines have received in the military department the right of citizenship, and will, there is no doubt, render great services to that department in future."

The Swiss Government is now adopting road locomotives. Last year Colonel H. Sulzer-Steiner, colonel of artillery, ordered a trial engine, which on its first journey "made an ascent of 17 per cent. over a stony road," viz., 1 in 6.

It is my privilege to bring the question before you to-day in a practical way, and to give you the data and experience I have gained

Summary of Work performed by Steam Road Engines during the Berkshire Manœuvres, 1893.

No. or name of engine.	Mileage. Loaded.	Mileage. Light.	Total.	Average load.	Coal used.	Cost of running loaded.	Tons. per mile.	s. d.	Grand cost of running loaded.	Maker's name and date of purchase or build.	Average speed per hour.	Miles.	Remarks.
24	680	518	1,198	24	2 $\frac{1}{4}$	68 0 0	2 0	68 0 0	Aveling and Porter, Rochester, 1884	8 H.P. Record run, 120, 34 hours' steaming. Aldershot.	4		
12	460	318	778	14	16 $\frac{1}{2}$	1 6 34 10 0	1 6	34 10 0	Ditto, 1873	6 H.P. To Idstone; return Crook- ham; engine 20 years old.	3 $\frac{1}{2}$		
10	340 $\frac{1}{2}$	49 $\frac{1}{2}$	381	20	8	2 0 34 10 0	2 0	34 10 0	Ditto, 1872	8 H.P. Engine 20 years old.	3		
23	217	291	508	20	11	1 8 18 1 8	1 8	18 1 8	Fowler and Sons, Leeds, 1884	8 H.P. Compound.	2 $\frac{1}{2}$		
21	357	340	697	16	12 $\frac{1}{2}$	1 6 26 15 6	1 6	26 15 6	Aveling and Porter, Rochester, 1885	6 H.P.	4		
Queen	438	172	610	20	11 $\frac{1}{2}$	1 6 32 17 0	1 6	32 17 0	Ditto, 1893	6 H.P. Compound. Record run, Chatham, steamed to Aldershot; distance, 72 miles; time, 22 hours.	4		
Doll	236	67	303	10	8	1 0 11 16 0	1 0	11 16 0	Ditto, 1889	4 H.P.	3		
Frog	150	Nil	150	25	4 $\frac{1}{2}$	3 0 22 10 0	3 0	22 10 0	Howard, Bedford, 1870	10 H.P. 30 years old. This engine pumped the water at Liddington.	2		
Grand Total	2,875 $\frac{1}{2}$	1,746 $\frac{1}{2}$	4,625	96 ..	249 0 2						

356 tons were taken to Liddington and brought back to Aldershot at a cost of 1 $\frac{1}{4}$ d. per ton per mile by means of these eight engines.

during many years' use of engines. During the late Berkshire manœuvres of 1893 eight steam sappers were employed in taking stores and matériel to Uffington, Idstone, Liddington, and the different rest camps *en route*, being a total tonnage of 356 tons, a distance of 150 miles, and although the engines were of different patterns and great age, this service was accomplished without accident and at small cost, which I venture to say fully proves that steam transport by road locomotives for the army and Reserve forces would render most valuable service, both in peace and war, and effect an enormous saving to the country.

For the past seven years the supply of hydrogen in tubes for balloon purposes has been transported from the base to the field by road engines, viz., from Chatham to Lydd, and Chatham to Aldershot.

What does it cost to move a ton of goods one mile on a common road with a road engine?

On the black board you will observe a table giving the work performed by engines during the manœuvres of 1893, and the moving of necessary stores from Pirbright to Aldershot, with the expenses incurred per ton per mile.

Work performed by Steam Sapper "No. 24," during the Manœuvres in Berkshire, 1893.

Month.	Journey.	Total mileage.	Mileage with load.	Coal consumed per mile.	Remarks.
June	Aldershot to Pirbright, Guildford, and back.	144	90	40 lbs.	
July	Aldershot to Uffington and back.	136	68	"	
,"	Aldershot to Hazley Heath and back.	20	10	"	
,"	Aldershot to Pirbright and back.	18	9	"	
August	Aldershot to Swindon and back.	146	80	"	
,"	Aldershot to Liddington and back.	150	75	"	
,"	Aldershot to Wallingford and Idstone and Crookham.	140	90	"	
September .	Crookham, Liddington, Swindon, Idstone, Crookham, and Aldershot.	148	100	"	
," .	Aldershot to Uffington and back.	136	68	"	
," .	Aldershot to Crookham and back.	56	28	"	
," .	Aldershot to Liddington and back.	144	72	"	

Work performed by Steam Sapper "No. 21" during the Manœuvres in Berkshire, 1893.

Month.	Journey.	Total Mileage.	Mileage with Load.	Remarks.
August	Chatham to Aldershot.	72	..	
"	At Aldershot.	16	16	
September ..	Aldershot to Uffington and back.	110	110	This engine was lent by Commandant S.M.E.
"	Aldershot to Crookham and back, with intermediate work 6 miles.	66	36	
"	At Aldershot, and thence to Crookham and back.	65	35	
October	Aldershot, Hazley Heath, Crookham, Uffington, Ashbury, and back.	138	70	
"	Aldershot, Crookham, Liddington, Swindon, Hungerford, Newbury, Mortimer, and Aldershot.	158	90	
"	Aldershot to Chatham.	72	..	

Work performed by Road Locomotive "Queen" during the Manœuvres in Berkshire, 1893.

Month.	Journey.	Total mileage.	Mileage with load.	Remarks.
August	Chatham to Aldershot.	72	..	
"	Aldershot to Uffington and back.	110	110	
September ..	Aldershot to Crookham and back.	66	66	Compound road locomotive lent by Messrs. Avelling and Porter.
" ..	Ditto	66	66	
October	Aldershot to Crookham and back.	66	66	This engine came from Rochester to Aldershot, 72 miles, in 26 hours.
"	Aldershot to Liddington, Newbury, Swindon, Hungerford, Aldershot	158	130	
"	Aldershot to Chatham.	72	72	

By the logs of the various engine-drivers that I have enumerated, and by our cost ledger, I have arrived at the expense of working steam transport. The cost per ton per mile with free military labour is 1d. per ton per mile, and if with hired civilian labour 2d. per ton per mile. This allows for uptake and depreciation of plant.

These results would have been much more favourable to steam had the engines been of a suitable military type, manufactured expressly for army transport, and embodying recent improvements and experience.

The engines used have been either of the agricultural type or of considerable age and an obsolete pattern.

They are of all sorts and sizes, designs, and patterns, like Falstaff's ragged regiment, with which he was ashamed to march through Coventry—

"The cankers of a calm world and a long peace."—*Shakespeare*.

The War Department has never had a road locomotive specially designed and built for transport service.

Were engines urgently required to take the field to assist horse transport, any sort or any pattern would have to be taken from any makers, and some would be found to be practically unserviceable or unreliable, and the drivers untrained or unused to them. There should be one standard type and size of engine, and all the parts of each engine should be interchangeable.

Every driver then would be accustomed to any engine put under his charge.

The improvements in road engines during the last few years have been considerable, and further improvements could be effected were they made expressly for the particular requirements of army transport.

I do not suggest specially designed engines, but only detail modifications to existing engines, that the fullest and greatest economy and advantage may be obtained, and that there may be no danger of breakdown.

I illustrate the sort of equipment that I consider is required, and show it on the screen.

1st. Photographs of the equipment which carried the officers' and men's baggage and packs for two infantry brigades, viz., eight regiments, during the late manoeuvres.

2nd. The length of steam road locomotive and train for moving 20 tons as it should be.

3rd. The corresponding horses and wagons required to move the same quantity of baggage.

The steam horse consumes only cheap coal or wood, while animal muscles must be renewed with expensive hay and oats.

1. I give you the weights of coal required and the water arrangements which must be made.

2. The weights and water that are required for horses moving the same load.

For the latter, 20 tons in 20 general service wagons and hored by 4 horses each, with 2 spare pairs and 4 N.C.O.'s and 2 officers.

Total number of horses being 90 horses for carrying 20 tons, and employing 48 men.

Forage, at 12 lbs. oats and 8 lbs. hay, 1,800 lbs.

Water, 56 lbs. per horse, 5,400 lbs.

Average daily length of march, 15 miles.

The road locomotive to move 20 tons 15 miles requires—

Coal	500 lbs.
Water.....	4,000 ,,

with a conducting party of 1 N.C.O. and 4 men R.E.

In giving the comparisons I would draw your attention to the fact that at the halt the engine ceases to require fuel and water, whereas horses require forage and water in the same quantity as when on the march. When the engine does not work it does not eat, and is costing nothing.

Again, the horses would be very much harassed with a continuous march, whereas the capabilities of the steam road locomotive are at least an average of 50 miles per day for month after month.

You see by the diagram that the Steam Sapper "Queen" came from Chatham to Aldershot (viz., 72 miles) in 26 hours, and went to its regular work the next morning.

The balloon Steam Sapper "No. 24" took 24 tons to Idstone (70 miles) in 30 hours, resting 8 hours and steaming 22, returning to Aldershot immediately after unloading.

Now I will illustrate what the proposed engine can take in cavalry pressed forage.

Each locomotive can haul 20 tons of forage 40 miles a day. This means it can supply 2,500 horses per day with 20 lbs. each.

The locomotive is not only useful for hauling, but for many other purposes, viz.:—

1st. It can be employed as a winding engine. It is fitted with a winding drum and 75 yds. steel rope (which can be run out without running the engine); additional lengths can be attached when required; and with this guns or other heavy weights could be taken over boggy places or swamps where horses could not haul them.

By unwinding the rope and attaching it to some distant tree or other object the engine could wind itself through almost any impediment that could arise.

2nd. It can be used as a stationary engine for sawing, pumping, &c.

As a pumping engine the locomotive is of great value and saving to the army, to the horses, and the men at camps and halting places.

By the attachment of pumps each engine can deliver 2,000 gallons per hour to an altitude of 300 ft., and can send the troops water at this rate through a portable main $\frac{1}{2}$ a mile long, thus alone saving a camp of, say, 10,000 men 75 pairs of water-cart horses. At Liddington one engine supplied the column encamped at Liddington with 35,000 gallons of water per day at a coal consumption of 6 cwt. only.

The water was pumped from a spring through $\frac{3}{4}$ of a mile main and 110 ft. head into the 10 different camps that were formed on the hill.

This effected a saving of at least 70 pairs of horses.

3rd. A development of the road locomotive is the steam roller, and by interchangeable wheels of greater width the road locomotive can be used for improving the roads over which troops may have to pass.

4th. These engines have been most successfully used, both in peace and war, to drive dynamos, and I believe Major Cardew, R.E., has reported most favourably of their efficiency, and they are being used by the Russian Army.

As regards the roads, I have not found any difficulty on any English road, and it must be borne in mind that engines can travel and make their own road wherever the ground is hard.

I have designed a special engine to go on ahead of the column with coal and water which will make the road for the steam transport train at the same rate, or nearly so, that the train is making.

When the country is sandy or boggy, many places would have to be corduroyed and specially made.

The engines are not affected by excessive heat, as horses are, nor by severe cold.

You may be under the impression that steam transport damages the existing roads, but it is, in practice, quite the contrary, owing to the great width of wheel of the engine and trucks, and from the fact that the engine and trucks do not travel on the horse track, but on each side of it.

The road is consolidated at the wheel base, and the pressure is towards the centre (see diagram); whereas in horse traffic you have the reverse. The horse road is left concave, as per diagram.

In estimating the comparative wear upon roads from wheeled carriages, and horses drawing them, General Morin, the eminent French engineer and director of the Conservatoire des Arts et Métiers of Paris, found that two-thirds of the wear is due to the action of the horses' shoes, and only one-third to the wheels.

It has been found in Kent, where over 800 road engines are in constant use, that these are the best roads of any county: that the cost of maintenance is less, and that the durability is greater.

It has been urged against the use of engines that there is a liability of horses shying, and being afraid of them.

On this head, I might first quote some observations made by the late Mr. W. Bridge-Adams, the celebrated inventor and engineering writer:—

"The shying and nervous horse is simply a wild beast, and no one has a right to bring a wild beast into the streets or roads, and a fine should be levied on the owner of the wild beast. Horses that go into the army are not addicted to taking, but rather to giving, fright; and it should be simply disreputable to be the owner of a wild beast."

"The horse should be as noble in his qualities as the gentleman who owns him—gentle and brave, and intelligent. What grooms call a 'fool of a horse' is not worth keeping, and every horse worth keeping is capable of education; and we may be sure that when our Fifth Harry 'witched the world with noble horsemanship' it was on an educated charger, 'a fiery Pegasus that could turn and wind,' and not on a wild beast."

"He must be a man of very limited taste who could wish for the extinction of horses by utilitarian engines; but, in truth, the engine is the friend of the horse, redeeming him from mere drudgery for the purposes of pleasure.

"We may take it as an axiom, that every horse worth keeping is capable of education."

The rising generation "take to engines," and pass them without difficulty. In fact, it has become part of the education of a horse.

For 20 years road engines have passed through the narrow streets of Chatham every day without an accident. And there are 90 engines daily working in the streets and roads of London, rolling.

In the engine I am specially recommending the noise and smoke are reduced to a minimum.

After the manoeuvres General Sir Thomas Baker Russell, the cavalry commander, informed me that he could better protect steam transport than horse transport convoys, owing to length of train.

I hope he will say a few words on this subject, and on the protection by cavalry of the transport train—the length of engine train being only a tenth of horse transport.

There are many other points of advantage and saving, such as the reduction in weight, and measurement and saving in freight when sending across the sea. The shipping tonnage would only be about a sixth of that of horse transport plant.

In the valuable work written by General Goodenough, R.A., he shows the number of men under arms—Army Reserve, Militia, Volunteers, &c.—that we have available if called upon, and are really hopelessly without field transport. This transport could not be found unless the matter be seriously taken up.

At present, there is work at Aldershot for five locomotives, irrespective of the movements of troops, and each engine would show a saving of 300*l.* a year against the present hired transport.

What I would ask is, that I may demonstrate during the coming season at Aldershot (where we have 15,000 Militia and 25,000 Volunteers coming to camp), and give practical proof of the economy and efficiency of this modern means of transport.

To carry out this, I venture to propose having four specially designed and specially made road locomotives and accompanying trucks, so that when called upon to assist the Army Service Corps in transport purposes, I may guarantee the work being efficiently done and carried out by means that are "up to date."

It has been proved—

1. That steam can be advantageously used.
2. That it is desirable to have special engines for our special work.
3. That there must be a proper organization, and competent drivers trained, and that efficiency and skill be promoted by suitable rewards.
4. And that we must follow out logically—as with any other weapon—"To study in peace-time how it may best be employed in time of war."

LORD WANTAGE: I am glad to be permitted to congratulate the lecturer upon his most interesting lecture, which I feel the more able to appreciate having witnessed some of the operations which he has so ably described, and which were carried out at the Berkshire manœuvres during the last autumn. I think anybody who has any love, or sympathy, or consideration for beasts of burden, whether they be horses or mules or other animals, must feel great pleasure in being convinced, as we have been by the lecture we have heard, of the immense advantage of steam transport over horse transport. While watching the manœuvres as I did last autumn in Berkshire I was conscious that improvement might be carried out in the transport. I saw some of the over-weighted and over-loaded wagons which were struggling up the hills, the horses or mules being perfectly incapable of dragging those over-loaded wagons up the steep acclivities in the Berkshire Downs. I remember one particular afternoon at the bottom of what is well known in Berkshire as the "Blowing Stone Hill," seeing at least a dozen wagons making off for Newbury, intending to get there in time for the afternoon reception of the troops, hopelessly stuck at the bottom of the hill. I shortly afterwards saw a locomotive go up the hill with the greatest ease. There was an object lesson from which any observer would at once feel the immense advantage of steam locomotion. I might perhaps be permitted to add one suggestion to those which the lecturer gave us as to the advantage of steam. He told us of these steam engines being used for pumping water and winding guns up high acclivities by means of pulleys. There is another matter for which these engines might be very advantageously used, viz., chopping straw and forage for the use of transport animals and cavalry horses. If there is one lesson more than another that agriculturists have learned during the disastrous season of drought of the last year, it is the immense saving which is effected by cutting up your forage instead of serving it as long hay or long straw. It is one of the things which Colonel Templer has not mentioned, which might be done. With a straw or hay cutter your forage might be cut up; also where the forage is inferior, as it must often be in a campaign, the forage might be steamed. A jet of steam might be sent through it, which knocks out all the impurities and makes the forage as sweet as possible. I do not think the lecturer should lay too much stress upon the necessity of having one special type of engine. Of course that is very desirable if we can have it; but in a country like England, in a case of invasion, you would find in all parts, owing to the great advance which locomotives have made in agriculture, these traction wagons distributed all over the country, and, of course, of different types. But although they are of different types, still they would be of the greatest possible service, and if they were requisitioned in a campaign or during autumn manœuvres, those engines which are used for agricultural purposes would be of the very greatest possible service, and you might bring them into very great use. I think Colonel Templer mentioned that in Kent alone there are over 800 road engines in constant use. What an immense service that would be to a military commander who went into Kent to be at once able to get such a large number of engines to serve him for moving the transport! That seems to me to be a power of the greatest importance possible to be placed in the hands of your military commander. I was certainly astonished at the paragraph which says that Colonel Sulzer-Steiner, of the Swiss artillery, spoke of an engine which, on its first journey, made an ascent of 17 per cent. over a stony road, namely, a rise of 1 ft. in 6. That is a most remarkable ascent. It is an exceedingly steep road, but when we read that the Swiss have adopted these for their military transport in a mountainous country and amongst a practical people like the Swiss, who I suppose have very few miles in their territory which is not on a considerably ascending scale, it shows, at all events, that these engines can be used for making great ascents. One of the great difficulties which would, I suppose, have to be encountered, would be that of providing fuel. Fuel is not to be found in every country where you would be campaigning. I do not know whether in the special construction of these engines they would be made so as to be able to burn some other material beside coal. I am very much interested in the lecture which Colonel Templer has given, and I am sure we are very grateful to him for the light he has thrown upon the subject.

Colonel GRATTAN: The General Officer commanding the South Eastern District has given me permission to state that he has tried these engines for both ordinary work and for manœuvre transport, and in both respects they have acted admirably. He finds that, so far as he has tried them, they can, under certain conditions of distance and weight to be carried, compete with great advantage against the railway companies in the matter of expense. For instance, on a very recent occasion, a large quantity of stores was conveyed by a traction engine at a rate of 6s. per ton for the entire distance, the lowest Chatham and Dover railway rate for the same being 10s. 7d. per ton. In addition to the saving of money it obviated the double handling of the stores at the collecting and delivering railway stations, as the traction engine took them direct from the issue store to the receipt store. With regard to the general question of the employment of road engines, I think no one who has had experience of them can have the slightest doubt that ultimately they are bound to be introduced largely for military transport purposes. I have seen a good deal of their working, and have made inquiry about them, and am an advocate for their introduction, but I want to avoid the mistake of trying to prove too much for them; I will, therefore, very shortly state the limitations to their employment as they appear to me. It would take a very long essay to deal with the subject in detail. Road engines are impossible for regimental transport purposes on active service for the reasons—1st. They cannot be subdivided to meet detached company requirements. 2nd. In case of an accident to an engine, the equipment and supplies of an entire battalion would be delayed, possibly for many hours; whereas with horses the teams behind simply pass on, or the greatest delay that could happen would be the detention of the teams near at hand, till the load of the disabled wagon was distributed. 3rd. As regimental transport, they would come within the zone of attack, and if a shot pierced a boiler, the battalion it belonged to would at once be deprived of its entire transport. They cannot be substituted for wagons for distribution purposes. It would be obviously impracticable to employ road engines in the thousands of cases in which small quantities of stores and supplies have to be delivered. They would be invaluable for home mobilization transport. They would reduce the cost of the transport of stores and supplies for manœuvres to a minimum. They would, in a great measure, solve our transport difficulties on active service, in all countries where the physical features admit of their employment, for establishing store and supply depôts along the line of communication, as it is on this work the great bulk of transport is employed. The conditions of active service transport abroad are utterly different to anything that experience teaches us at home, and therefore the result of an experiment on roads in the vicinity of Aldershot, or, in fact, on roads anywhere, would be valueless as a guide for field service. We all know their capacity for road work in England, and what we really need is a series of experiments on, as nearly as possible, Service conditions, and there are still tracts in England where these could be carried out.¹ For a considerable time I have been investigating the rates charged by the various carrying industries, rail, road, and water, and that of 1½d. per ton per mile, quoted by the lecturer, is so startlingly low for road engines, I should like to ask whether it includes the pay of the superintending officer and non-commissioned officers, the full regimental pay and working pay of the men, the cost of their rations, and a percentage of the cost of their clothing.²

Note.—I do not agree with the lecturer that engines should be made more powerful for military purposes, as this would necessitate increased weight, and would involve putting too many eggs in one basket. What we want for active service is a light handy engine capable of hauling 5 tons; it would cross ground

¹ If experiments are ever instituted, I suggest that they be not carried out by experts, who are very apt to establish standards perfectly unattainable by the average man, and in a case of this kind we particularly want only fair average results. After obtaining them they must be discounted by about 30 per cent. for the unavoidable friction mentioned by Clausewitz as incidental to war.

² There are other items to be reckoned to get at the exact rate, such as interest on the capital outlay, and various establishment charges not included in the above question.

that the heavier engine would sink in, and almost any bridge would be safe for it, or could be quickly made so. Two conditions are indispensable in its construction, the centre of gravity should be very low to prevent oversetting, and the driver should be able to see close ahead and on both sides of his engine to obviate accidents in working about crowded depôts.

Captain MAUDE: With regard to what the last speaker has said, these engines have been tried in foreign countries pretty well all over the world. I have seen them myself running up at Quetta and over the hills of Beloochistan, and they go over that country with very great ease. Nobody proposes to take them across country, over bog or slough; you use these engines whers the conditions suit and nowhere else. We have had six or eight engines up at Quetta, and those engines, as the lecturer said, practically made their own road. We lined out the road, we dragged out the road metal with engines, we laid the metal in front of the engines and rolled it down. Of course if we came to quicksands we had to get them over another way, then we put on the horses. In the meanwhile we saved the transport and labour of thousands of horses, dragging down the material over miles of road. I have never been able to understand why we have not taken up this question more thoroughly. I have been studying this particular thing for the last sixteen years, and I think we want to move with the times. As the lecturer said, most of the engines are twenty years old. Now there is almost as great a difference between the twenty years old traction engine which you see used here and what we could get now as there is between one of Webb's compound engines and the old "Rocket." We must move with the times in these matters. As regards the cost of fuel, the fuel is a consideration to think of and has to be carried, but the weight of fuel to be carried is less than the weight of forage—and of course the engine is not eating its coal when it is standing still. The question of oil fuel is suggested. I think that will be used, but I do not think we are ready to do it yet. In another five years or so we may perhaps be able to work without steam and without boilers, simply by vaporising the gases. That probably is within measurable distance.

Colonel FRASER: Only those who have lectured themselves can fully understand the great obligation we are under to anybody who will take the trouble that it involves to prepare and to explain their views. I am sure if I feel bound to differ from my old friend Colonel Templer, he will understand that I do so in order to get at the truth of the matter, and not from any adverse spirit. The general proposition put forward is, I think, this, that the work of steam is more economical and more compact than the labour of men and animals. We are all agreed upon that, and I may say that 25 years ago, when the question of these steam sappers was taken up, that view was the main reason for taking action at that time. I am unable to agree with Captain Maude and some others that progress has not been made by the military authorities in this direction; on the contrary I think the Royal Engineers have influenced the manufacturers in this country very considerably by exhibiting what could be done and what improvements could be made, and on the whole have contributed as much as they have got from the outside world. Having said that about the general proposition the question comes, can we apply these road locomotives to every case in war? What we have to think of is not peace. No doubt for peace manœuvres it would be more economical to employ such engines, and I think I may safely say if any general officer under the advice of his experts thinks he can more economically employ road locomotives for transport than hired transport horses, I do not fancy there is any difficulty in his way. The peace question is interesting, but is relatively unimportant compared to the war question. There are three kinds of countries that we have to deal with; first, highly civilised countries where, if you have numerous and good roads, you are pretty sure to have numerous and better railways. Secondly, countries much less highly civilised than Europe, such as India, where you have a certain small number (a very small proportion) of first rate military roads, and where you have a relatively larger development of excellent railways as a rule following the same lines as the strategical roads. Thirdly, countries where there are neither roads for heavy wheeled transport, nor railways, and unfortunately these are the kind of countries with which we are most concerned in the many wars we have all over the world. No doubt the strong point that Colonel Templer has brought

forward is the shortening of the columns; a point recognised by those who first applied traction engines to military purposes. Nobody who has watched transport or seen war can doubt that it is an immense advantage, so great that we should make great sacrifices for it; but there is another point still more important, and that is that you must be able, when your enemy runs away from you to go after and defeat him, and if you attempt to tie the heads of your columns of transport to a road you lose the power of taking the offensive and following your enemy where he will naturally go to get out of your way. For that reason I think there are many serious objections to the very wide use of road locomotives, though when the country and the roads are favourable they are very suitable for line of communication work. In special cases in Belgium, for instance, where there is coal and water to be had, where the roads are flat and admirably made, or in Lombardy, the use of these road locomotives is peculiarly suitable. The Italians have gone a long way in this direction. The fact being that they have not horses enough in Italy to man the transport, and therefore they must look round for every possible means, and their inevitable theatre of war offers excellent opportunities for the use of these road locomotives. But the one-fifth of the inhabitants of the world that we have to deal with chiefly live in places where there is not a very high development of roads or railways, and for that reason wherever the difficulty of transport is very pressing, we turn to the railways as far as they can carry. It is perfectly well known that the loss of transport animals in Afghanistan, and their relative inefficiency, led to an immense expenditure on strategical railways which have extended to Quetta and Peshawur, and are being pushed further forward; and my own belief is where you can see beforehand that you are going to act along a certain line of route, the better plan will be (if you can foresee it in time) to make a railway, because you will get infinitely more out of that than you can out of road locomotives. The lecturer implies, I think, that the terrible expenditure of transport animals in Afghanistan might have been avoided by using road locomotives; but when the column first went up the passes into Afghanistan their condition was such that you could not have got road locomotives up even without loads. Captain Maude mentioned just now that road locomotives were successfully used at Quetta. I saw them there not many weeks ago rolling existing roads behind the defences on the flat plain which has a hard surface; but they had to be carried up by train in the first instance, and, except in this neighbourhood, I do not think any attempt to use them has been made. The transport losses at Plevns have also been referred to. I was in Bulgaria during the War of 1877, and I have no hesitation in saying that you could not have used road locomotives on the tracks, called roads, which were very often two or three feet deep in mud. Where you can use them undoubtedly they would be very valuable, but do not let us delude ourselves into thinking they are going to do everything. You must have a good, hard, well-made road of fair width. You must have access to water, for a road locomotive wants half a ton of water each hour, and cannot go off the road to get it, and you must lay down stores of fuel. You cannot always burn green wood, and if you have to do so you must cut it up, all of which causes delay. Another point is that Colonel Templer claims for these engines a greater speed than that of ordinary transport. Our experience is that practically three miles an hour is about the most you can count on in England, and even if you could do seven, my point is you cannot possibly drive a car of Juggernaut along a road crowded with men, horses, and oxen, unless you keep pace with the rest of the column; therefore, the great advantage of a more rapid means of transport does not hold good. For all these reasons, while I quite agree there are circumstances under which some transport of this kind will be very useful, and where, if we can foresee the special contingency, we should prepare for it, still I do not think the occasions are likely to be at all as numerous as the lecturer supposes, and I should be sorry to see the establishments of horses for the army in any way reduced on the plea that steam transport can generally be relied on to take their place.

Lieutenant-Colonel TEMPLER: Lord Wantage asked about the winding and about the engine going up a hill. There is no doubt it would do all those things, and be available for any work that is required; and I quite agree that cut provender is

much better to give to working horses than any other. Colonel Grattan commenced by saying that our expenses were lighter than on the railway, and says the steam sapper expense would be 6s. a mile, and the railway charge is 10s. 7d. That is just my experience; in fact, my experience is you cannot possibly get the railway to do it at the price you can do it with the sapper. I do not, of course, know exactly how your 6s. a mile agrees with my 10s. All my working had to be taken out to make the charges to show the work was done for either the Army Service Corps or the Royal Engineers, and our expenses were 1d. a ton per mile, of which we said no money for any men at all, neither officers nor training men, or anything. It may be asked whether my further estimate of expenditure, another penny a ton, would be sufficient to pay other expenses, such as a share of my own money, and I think it would really pay everything. It also occurs to us, what is the value of an engine driver? I was only asked this morning. Of course, a man trained as a soldier and as an engine driver with all his other work is an expensive man, and I know well what it costs to train a civilian engine driver, and I do not think you can train a road locomotive driver under 200*l.*—a civilian—and I do not think he can be trained perhaps for that money as a soldier. But still that is a very small matter because we have such an immense margin. The very lowest cost on any railway for the carriage of the commonest thing you can get, say coal, is 1*4d.* a ton per mile at Aldershot station, and then you have to pay to fetch it up from the station at the rate of 9*d.* or 1*s.* a ton, so that we are under the price at which railway transport can be conducted. And on that I also say that with a more perfect engine we can do it at a cheaper rate than that. Captain Maude is quite right in saying that the whole purport of this lecture is that we must move with the times. The agricultural engine is the engine of the day in this country. The makers, Messrs. Aveling and Porter, Messrs. Fowler and Sons, and Messrs. Burrell, are all making the very best engines they can for a very small sum of money to work threshing engines, threshing machines, and to do farm transport, and they will make an engine for 400*l.* that will do almost anything. They say, however, that as they have very often a considerable time to wait for the payment, they have no money to make experiments in engines for the War Department, and that their demand for engines is so small. Messrs. Fowler have built two or three, and Messrs. Aveling and Porter 30 or 40, and therefore it is with the inducement that they may have a sufficient sum of money to make a proper engine that I am asking for the plant and material. There never has been a properly constructed truck for any army purposes; there is not a single wheel or any truck ever made that would run over country such as Colonel Grattan describes. Colonel Fraser says the Afghan campaign proved that we must make the railways forward; I have no objection to civilians making railways, but I do not think that we can ever rely, in any campaign in any country, on a railway being made on any gauge to be of the slightest assistance. Take, for instance, Suakin; we were there some three months, and during that time, with the plant and everything to hand, we failed to make more than about 28 miles of railway. Everything was sent there, and it was a terrific business to try and make it. At Suakin road engines could have run anywhere. The furthest point we got to was Ottao, and that was in three months, but the road engines would have been there within three days of our being there, and could be now. You say you want a hard road to go on, and you imagine I shall say "Yes, you do." I say "No, you do not," and I will soon prove it. There are no doubt many here who have seen ploughing engines take up their position and go to work when they have been a foot under water, and have gone right down to the ashbox in the wet. The fact is, for the road engine you do not want a road at all; all you want is your track consolidated, and wherever a one-horse wagon can go, if a locomotive or road locomotive is properly constructed it can go. I do not say that engine 24 could, but if that engine was improved upon it could. Then Colonel Fraser says that you do not approve of an engine going more than three miles an hour.

Colonel FRASER: I did not say I do not approve of it; I said as a matter of practical experience based on many years of use that is all that I find you can rely on.

Colonel TEMPLER: In that you are quite right. All I say is I want that engine

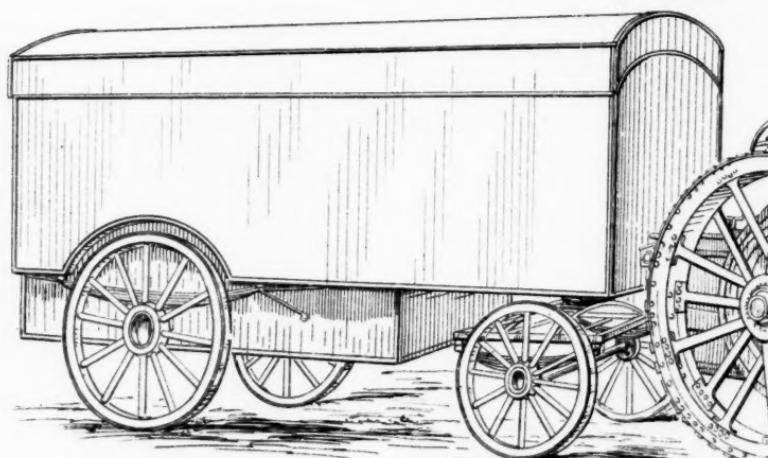
to be able to go the seven miles. It is not that it is to make the distance in the time, for three or four miles an hour is quite fast enough, but the engine must have the ability if it is going to move with a column of troops to go seven miles, for if not, as we found in the Berkshire manoeuvres, it could not get out of the way. It is not that I want to run the engine at seven miles, but to have the power to be able to do it if necessary. Take, for instance, No. 23, a Fowler's compound—a magnificent engine ; it is designed and built to run $2\frac{1}{2}$ miles an hour. You cannot run that engine at three or four miles an hour without breaking it down. Directly you run an engine light, and try to get bit of speed when you are pressed, instead of 150 revolutions [you have to run at 300, and you break your engine down. It is to prevent accidents to engines that they must be built to run at a greater speed than the farmer's traction engine. I need not go into the details as to what other things should be put on the road locomotive to make them road locomotives as against calling them traction engines, because, of course, they are all traction engines, but the maker uses the term "road locomotive" as against "traction engine," for the purpose of showing that it is a quicker, and smarter, and better engine. Both engineers and makers will agree with me that there are many little improvements that you can put on to the engines. One point is this, all our engines are made with steel fire-boxes and steel tubes. On the Great Western Railway and other railways they are made with copper fire-boxes and metal tubes. I would ask you if a locomotive superintendent of a railway with its level road finds it necessary to have a copper fire-box with copper tubes to keep his boiler from leaking at every connection, why should we in the army stick to steel fire-boxes and tubes when we have to run over boulders and anything else without rails or springs. It stands to reason when we drag our engines in the places we do get them into in foreign countries we should get leaky tubes, and it is for those reasons that engines have failed. They have failed in the past, I admit, up till to-day for the movement of troops or accompanying troops, and they must fail again if you rely on them. If you hire the whole of these 800 engines in Kent to move transport they will all fail you, and it is on account of that failure that I want you and the country to have the proper equipment. With regard to the question of railways, I must again say, however and wherever you make the railways, steam road locomotives, with properly constructed carriages to carry what they are intended can run at a less cost and in quicker time than you can get railways to do it. Our designs are for steam locomotives to do military work of eight horse-power ; the designs of railway engines are not for eight but for a thousand horse-power engines. Now I say I want more power in the eight horse-power engine to work army transport if it is going to run successfully. Therefore, the conclusion I have come to on that is this, that we cannot be satisfied with those engines that Lord William Seymour tried, because they were not good enough to go with the army loads, and therefore I again say that improved engines should be built, and improved trucks should be built, and that is the object of my paper to meet the requirements of our army.

The CHAIRMAN (Lieutenant-General R. Grant) : This has been a very interesting discussion, and I think I may say we are all pretty well agreed in the conclusions we have come to. Of course there have been differences of opinion in minor points, but on the general points we are all agreed, that is, that as far as possible we should use the very latest improved engines. Transport is the essence of military operations, the most important thing in some respects that has to be considered, and it is essential that we should use and utilize fully all the means at our disposal. There are certain minor points of detail which I need hardly trouble you with, but I think Colonel Templer rather takes what I may call too enthusiastic a view, probably due to his own extreme energy. He works himself at a tremendous horse power, and apparently thinks that all engines will work at the same horse power. An engine requires rest and repair, and cannot be worked continuously. Repairing shops would also be required, which would be a very considerable trouble in a campaign ; but the one main point on which I entirely agree with Colonel Grattan is that the great weight of the engines would almost necessitate the confining of steam traffic to lines of communication. The weight of the ordinary traction engine is 12 tons, and if you increase the power, as proposed by Colonel Templer, you would undoubtedly increase the weight as well, and that

weight is mainly on the driving wheel, and which for many objects would be found to be too great a weight to deal with. Colonel Templer, in concluding his lecture, says that it has been proved that steam can be advantageously used. I think we all agree with that, if we add the words "within certain limits." He says, "It is desirable to have special engines for our special work." On that point I am rather doubtful, because I do hold it is very important that we should be able to resort to the actual resources of the country, and that if you train men, especially in the army, they should be so trained that they can work any form of engine, and should not be tied down to one particular pattern. As regards the special pattern, the locomotive engines we have in our Service have been mainly employed by the engineers, and they have not been designed for transport. I do not think there should be any difficulty in designing them for transport if that should be desirable, and if we had the necessary funds. There must be the proper organization for training drivers, but as to efficiency and skill being promoted by suitable rewards, I have some doubt. My own experience is that you may give rewards for special skill, but not for actual performance, which may be in some cases a rather doubtful advantage. Then the last point is "to study in peace-time how it may best be employed in time of war." My own idea is that, on mobilization, especially should this be on account of invasion, the requirements of transport would be so great that no amount of transport which we could prepare in peace-time would suffice, and we should have to fall back on the resources of the country. I do, however, think that in many ways it would be a very excellent thing if some patriotic volunteer corps would take up the question of the organization and employment of the existing steam transport in time of war. I conclude by offering our very best thanks for this very interesting lecture to Colonel Templer, and also for the very excellent illustrations with which it has been accompanied.

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FIG. 1.—VAN TO CARRY 10 TONS OF BREAD AND
ENGINE CAN TAKE THIS AT THE RATE OF 8



Sketch.

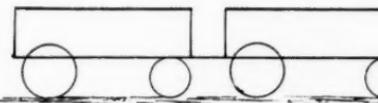
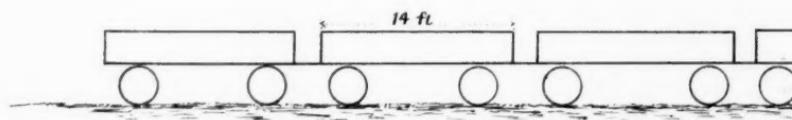


FIG. 5.—ENGINE AND 5 TENDERS AS HITHERTO, COM



READ AND MEAT OR FORAGE.
RATE OF 8 MILES AN HOUR.

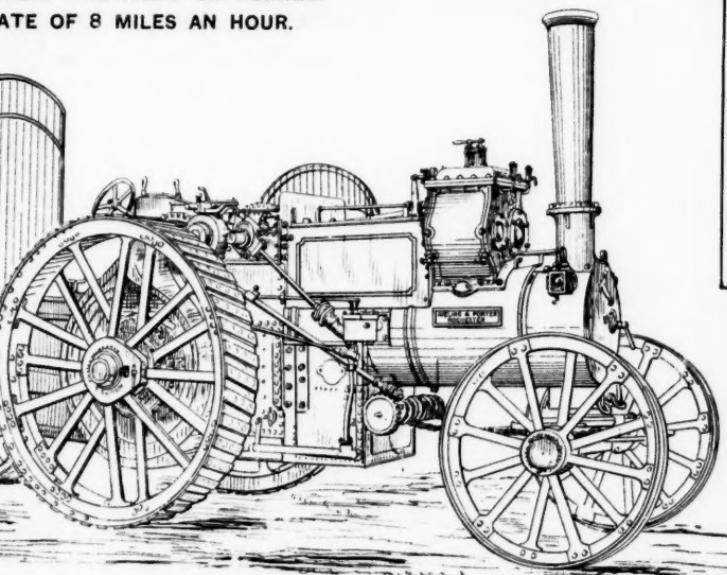
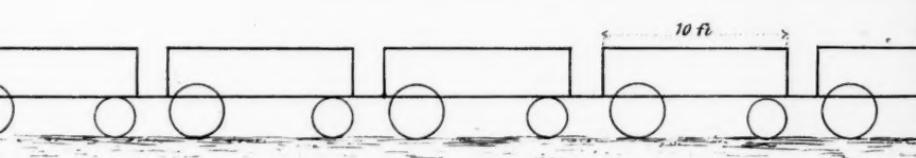
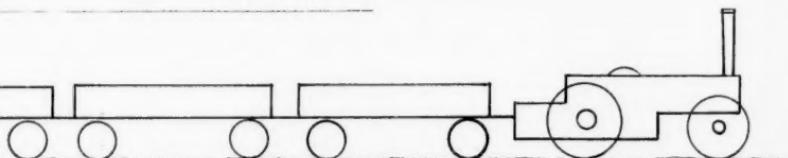


FIG. 3.—ENGINE AND 8 TRUCKS, WITH 20 TONS PRINTING AND PHOTO. GE



ERTO, COMPARE WITH FIG. 4 AS IT SHOULD BE.



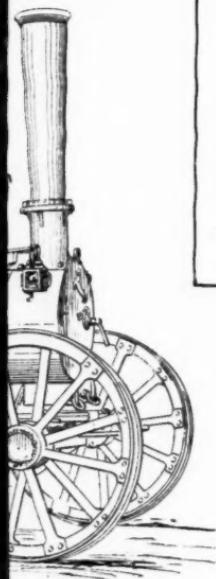


FIG. 2.—ENGINE AND TRUCK AND 4 TENDERS WITH
4 TONS COAL, WATER, AND STORES AS ON MARCH

Designed for Berkshire Manœuvres, and fitted by

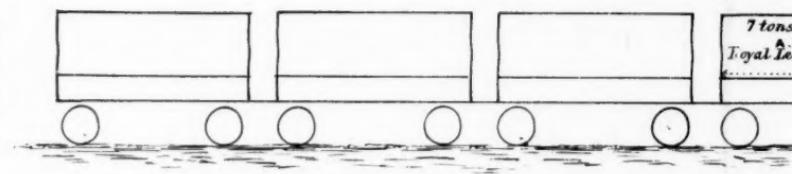
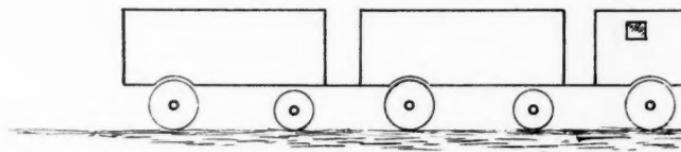


FIG. 4.—ENGINE AND 3 TENDERS, 1 TENDER FOR MEN.



20 TONS PRINTING AND PHOTO. GEAR, ON ROAD TO "IDSTONE."

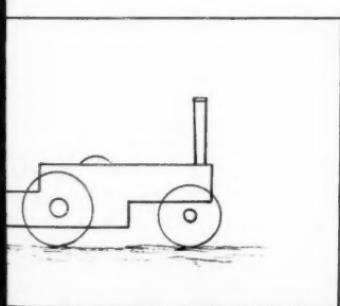
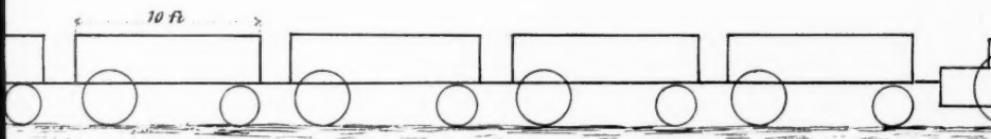


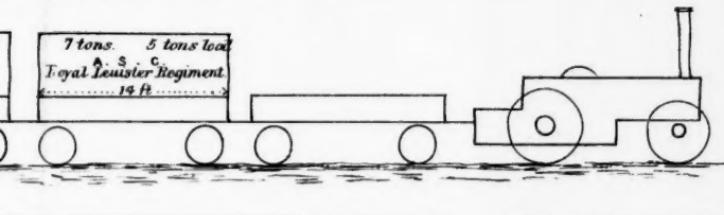
FIG. 6.—SHOWING G.

1 ton weight of wagon, 1 ton stone

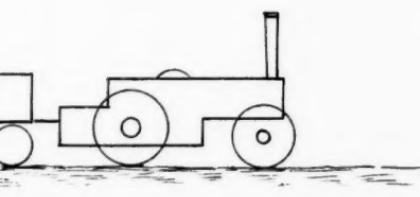
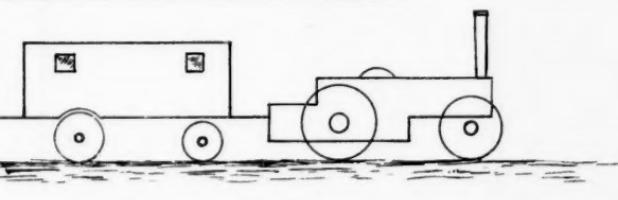


DERS WITH 20 TONS LOAD IN 4 TRUCKS, AND
IN MARCH ON COLUMN, BERKSHIRE MANOEUVRES.

, and fitted by Col. Bridge, Com. A. S. C.



OR MEN. 2 TENDERS TO HOLD 20 TONS CUBIC SPACE.



HOWING G. S. WAGONS.

ton, 1 ton stones, with 4 horse team.



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FOREIGN SECTION.

THE ITALIAN OPERATIONS AT AGORDAT, IN THE EASTERN SUDAN : NOTES AND DOCUMENTS BY GENERAL E. ARIMONDI.

Translated by Commander A. PAGET, R.N.

H.M.S. "Dolphin."

Suakin,

June 6, 1894.

Having but recently returned from Massawa, where I was received with every kindness and consideration by General Baratieri and the garrison of Massawa, I was naturally in a position to hear many interesting details of their recent engagement with the Dervishes, and to the courtesy of General Arimondi I am indebted for his official account of the operations, of which I venture to submit the following translation, which I must preface with a few brief remarks.

The author's description of current events is not always in absolute accordance with our annals, but this being merely a translation, I have not attempted to tamper with the original text, but have added a few notes.

To anglicise the Italian nomenclature of the country, I have had the invaluable assistance of Major F. Wingate, Chief of the Intelligence Department of the Egyptian army, and now acting Governor of Suakin.

The system adopted has been that (lately come into force) of the Anglo-Egyptian War Office.

I am of opinion that General Arimondi generously gives more than due weight to the material support he received from the fort of Agordat during the engagement.

The culmination of the action was the capture and recapture of the 1st Battery on the hill side, in the open, and at a distance of 2 kiloms. from the fort—a long range for effective fire from 7-cm. guns; nor was there at any period of the action any rifle fire from the fort itself. Of this fact many officers assured me. The Dervish force was composed, for the most part, of blacks. In organization and discipline they were evidently much superior to the hordes that have come into contact, from time to time, with the British and Anglo-Egyptian troops, but it is interesting to note that with this increase of discipline there has been, apparently, a corresponding loss of that dash and *élan* which has always been their leading characteristic when opposed to our troops.

There is a marked improvement in the ammunition turned out of late years by the Khartum factories, missfires now being the exception.

The captured machine-gun that I closely examined was perfectly efficient. It was composed of several parts of different guns, and missing pieces replaced by local work. (Guns probably taken at Baker's El Teb, 1884.)

The numerical disproportion of the opposing forces at Agordat was more marked than in any of our collisions with the Dervishes since Abu Klea; and General Arimondi's success was a brilliant achievement, due almost entirely, I think, to his disregard of that excessive caution which has sometimes stamped our method of dealing with the same enemy in earlier years.

The Dervishes, parched with thirst, and little dreaming that the Italian-led native force would leave their entrenchments and attack, had scattered wide, and

they had no time to bring their guns into play when General Arimondi's advance disconcerted them.

Had that advance been delayed an hour, even, I think the result might have been very different; and beyond this force the Italians had but few reserves in the colony.

A disaster here would, undoubtedly, have had far-reaching effects in Europe eventually, but first in Africa, where all European nationalities are striving for the one goal—the possession of the Upper Waters of the Nile.

ALFRED PAGET.

Situation in the Sudan prior to the Engagement of Agordat. 21st December, 1893.

The possibility that the Dervishes, after their futile efforts to break through the barrier that separated them from Egypt and from Suakin, might turn their aims and their forces against the inhabitants on the borders of our colony of Eritrea, had not been unforeseen by our Government, and to meet that contingency they had preconcerted plans for the disposition of the garrison forces, and of the auxiliaries of Keren and of Agordat.

After the sudden and sanguinary discomfiture of the Mahdiists at Wadi Halfa, the Khalifa, feeling confident that the Anglo-Egyptians would not follow up their victory by marching on Khartum, confined himself to leaving a corps of observation to watch that frontier, and with occupying Berber in force, leaving to Osman Digna and his Hadendow the task of harassing the Anglo-Egyptians in Suakin, and of reconquering that province. The destitution which the bad government of the Khalifa and failing harvests had brought on the Sudan, the necessity of maintaining large forces, the anticipated growth of the confined population of the interior, and the necessity—to keep Mahdiism alive—of being always at war, or it would die away, decided the Khalifa to launch forth several expeditions nearer home, and so, for almost two years, bodies of more or less trained troops were despatched against the Shilluk, the Denka, the Niam Niam, the Senussi, and in Kordofan against the pretenders to the Khalifate. From these operations, more of the nature of raids than war, the Dervishes almost always returned victorious, with much plunder, a wealth of cattle, and numberless slaves, having as usual made desert the country through which they passed.

In Kordofan only, it seems, that Fortune had been much less favourable to the Khalifa, and there Mahmud Ahmed's army had been shut up in El Obeid, and the troops sent to relieve him, commanded by Ibrahim el Khalil, had been quite recently (September, 1893) defeated at some days' march from there.

Meanwhile the harvests became more abundant, particularly in the eastern provinces, so that the material lookout for Mahdiism seemed for the moment brighter, save in Kordofan alone.

That it was the intention of the Khalifa to strike one blow against our colony was common gossip, even in December, 1892, but if such orders had been actually given, the Emir Ez Zeki Tummel,¹ whose

¹ One of the greatest of the Dervish Emirs; he commanded the Dervish force

duty it would have been to carry them out, saw the difficulty, and thought it better to withdraw to Gallabat. Perhaps this was the main cause of his disgrace, suspected of being of weak faith; he was killed, and in his place the command of the Gedaref army was given to Ahmed Ali, a relation of the Khalifa, the same leader who operated against us in December last.

It seems that the general scope of the enterprise was to push right up to Keren, to endeavour peradventure to strike a blow against that province, and then, on their return, to raid on the population of the Barku province, the prosperity of which had raised the cupidity of the Dervishes, and perhaps Ahmed Ali's army might even be able to establish itself in the Barka Mogareb, and add that province to the Sudan.

It is now certain that the Dervishes expected to find only the usual garrison at Agordat, in which case its fall would have been certain; only on their arrival at Kufit, as we gathered afterwards, did they become aware that the garrison at Agordat had been reinforced, and they began to doubt of the successful termination of their enterprise.

Certainly, up to the engagement of the 21st December, the Dervishes did not believe that the colony of Eritrea could have such a large force at their command.

The Attitude of the Dervishes towards the Italians and Anglo-Egyptians.

Our occupation, being essentially limited to the basin of Massawa, had not hitherto brought us into direct contact with the Dervishes, on either our northern or eastern frontiers, and the rumours of their achievements would come to us only as a far off echo; for all that, the Government of Massawa, believing themselves prepared for all emergencies, and having experienced Osman Digna's daring tactics, were nevertheless surprised when arranging some posts of observa-

of 87,000 men, at Gallabat on March 9, 1889; although virtually defeated by the Abyssinians, the death of King John by a chance bullet enabled Zeki Tummel to turn defeat into victory, and not only did he succeed in routing the entire Abyssinian army, but he captured the King's body, jewels, correspondence, &c., which was forwarded to the Khalifa at Omdurman. Zeki's force subsequently suffered terribly during the great famine. A local revolt of the Shilluk tribe was afterwards suppressed by Zeki, and since then he and his force had been quartered in Gedaref, one of the most fertile spots in the Sudan. Zeki built himself a good house, which he filled with the choicest women of the country. The bulk of his force were blacks, and he was greatly beloved by them. His various campaigns against Abyssinia had enabled him to amass boundless loot, and the well known comfort and state in which he lived excited the cupidity and jealousy of Ahmed Wad Ali, a nephew of the Khalifa, and formerly one of Zeki's subordinate Emirs. This Wad Ali surreptitiously reported to the Khalifa that Ez Zeki's wealth and popularity were a menace to his authority, and in consequence Abdulla summoned him to Omdurman, where he was thrown into prison with his son, and both were starved to death towards the close of 1893. Ahmed Wad Ali was sent to replace Zeki, and with orders to advance at once against the Italian outposts, as the Khalifa feared that inaction would probably breed mutiny amongst Ez Zeki's followers, incensed at his treacherous death.

tion towards the Lebka, which seemed to be their most threatened point.

In fact, on the 11th May, 1885, a strong Dervish force crossed the Habbab country, surprised a post of Bashi-Bazouks at Amba, and pushed right up to Emberemi (12 kiloms. from Massawa). On their retreat the Dervishes were attacked and routed by Ras Alula close to Asus.

From that date till the beginning of 1889 the Dervishes, on the one side, hurled themselves against the Abyssinians (Kufit, September, 1885; Metemma, March, 1889), and there were frequent reciprocal raids for booty ; while, on the other side, they were engaged with the Anglo-Egyptians, for Osman Digna aimed at the conquest of that territory that lies between the Atbara River and the sea, and especially of the ports of Agig and Suakin, the more so as the Beni Amer and a section of the Habbab tribes had embraced the Mahdi's cause.

Besides these, the Khalifa was engaged in breaking in the rebels at Kordofan, and in watching the Anglo-Egyptians on the Nile (battle of Wadi Halfa, July, 1889).

For these reasons the action of the Dervishes on the Italian front was in that period limited to an unceasing propaganda amongst the Moslem tribes, which was disseminated right up to the Dankali.

Between the Government of Massawa and the Dervishes there was no exchange of relations of any kind, nor could there be, for, at that time especially, the followers of Mahdiism could hold no intercourse with Infidels.

The submission of the Habbab country, the occupation of Keren, and the extension of our protection to the Beni Amer tribe, brought the Government of Massawa into more direct touch with the Dervishes, and it was naturally then only that hostilities broke out on our frontier.

In May, 1888, the Dervishes threatened the Habbab, and in July they destroyed Adobana, driving back Kautibai on Ater, and again in December the Dervishes raided in force on the Barka Mogareb.

Early in 1889 there were repeated raids into the Habbab country, and here, to neutralise their country, the people paid tribute to Abu Girga ; this notwithstanding, there was a repetition of these raids on the Habbab towards the end of that year.

In February, 1890, in consequence of a raid in force, led by Abu Girga in person, against the Habbabs, the Government of Massawa proposed to their Ministry at home to advance a native battalion to Nakfa. About the end of March, the Dervish raids having again begun, it was decided to operate against them. Our column left Keren 31st March, and by the middle of April, having driven back the Dervishes, our troops returned to their cantonments. Shortly afterwards there was a renewal of intimidation and raids on the Beni Amer tribe, led by the Emir Faragalla ; consequently, a company was pushed forward to occupy Bisha. Whilst they were on the march the Dervishes destroyed the village of Daga, which led to the first action of Agordat (27th June, 1890), in which the enemy's column was completely destroyed.

This made the Dervishes more cautious, so that, although the Emirs of Kassala sent threatening letters vowing vengeance, with the exception of some slight inroads across our western frontier, they did not for two years venture on any incursions of importance, keeping aloof even from the fort of Agordat, which was garrisoned by us.

In May, 1892, rumours of a threatened eruption suddenly took shape, but the raid was pushed instead into the Baria Eghir country in June, the Dervishes not daring to cross the Mogareb. However, being overtaken on their retreat at Serobeti by the Agordat company and the Barka levies, they were defeated on the 16th of June. This new encounter gave us 18 months' tranquillity, which would have been maintained for a much longer period had not the internal state of the Sudan forced the Khalifa to make some hostile demonstration against the tribes that were under our protection. For those well posted in current events it will be unnecessary to touch on the struggles on the Nile and about Suakin up to 1890.

It will be sufficient simply to refer to the actual conflicts after that year to show the relative position between the Dervishes and the Anglo-Egyptians.

On the side of Suakin, after the Anglo-Egyptian occupation of Tokar, one can say that hostilities never ceased all through 1891, and although Osman Digna, for the want of reinforcements from Berber and Khartum, and also perhaps because he had been seriously wounded, was not in a position to attempt the recapture of Tokar, still, by means of raids on a larger or smaller scale, even right up to the walls of Suakin, he kept the country and the garrison continually under arms and in a state of tension. In the following year the situation was more serious, for Osman Digna with a considerable force posted himself between Tokar and Suakin, and the Anglo-Egyptian Government considered it necessary to despatch the Sirdar Kitchener Pasha to Suakin with reinforcements of a battalion and a squadron of cavalry. About the end of November, 1892, Osman Digna, however, withdrew, leaving his nephew, Mahomed Taher Ali Digna, at Erkowit, with orders to cut the communications between there and Tokar.

In January, 1893, Osman Digna again took the field and repaired to Erkowit, and in February, having established himself at Handub, about 11 miles from Suakin, from where he began raiding, the Suakin garrison was sent to attack him.

On the Nile, also, collisions between the Mahdiists and the Anglo-Egyptians were of continual occurrence. I will refer to some of these: on the 12th May, 1892, the Emir Osman el Azrak swept down on the village of Serra Gharb to the north of Wadi Halfa, and retired after having destroyed the place. In November, 1892, the Dervishes having concentrated at Suarda (slightly to the north of Dongola), the Anglo-Egyptian Government reinforced the Wadi Halfa garrison, fearing an attack, which, however, did not come off.

In December, Lord Cromer was apprehensive that the Dervishes might endeavour to seize the Murat wells, half-way between Korosko

and Abu Hamed; instead, however, they, on the 2nd January, 1893, attacked the wells at Ambigol, but were driven back.

In February, 1893, there was again anxiety for the safety of the Murat wells, and the tension continued through November, and on the 13th of that month these wells were actually attacked, but the Dervishes were forced to retire. The post of Murat was reinforced. About the end of January last we heard that there was another collision between the Anglo-Egyptian troops and a Dervish force sent from the army under the Emir Yunes stationed at Dongola, but of this we have not as yet had precise details.

The Commercial Relations between Massawa and the Sudan from 1885 to 1893.

After the occupation of Massawa by the Italians, we kept up trade with the Sudan for a few months, that is to say, up to the fall of Kassala, in July, 1885, although it had diminished considerably in consequence of the cession of Senhit to Abyssinia, and the withdrawal of the Egyptian garrison from Keren, Amideb, and other points. Even the principal merchants in Massawa kept correspondents in Kassala, Gedaref, Rufaa, and Khartum, from which they drew principally gum, ivory, coffee, cotton, and tobacco.

The Keren and Kassala road then became impracticable, and the Mahdiist movement having come to a climax amongst the Hadendoa, generated by Osman Digna, who in February mastered Tokar, trade entirely ceased for some months.

Then the Az-Azeri, many of whom had gone over to the Dervishes, reopened trade, carrying goods by sea from Massawa to Taklai, and from there to Tokar on camels. The Massawa merchants, emboldened, followed their example, and for some time Tokar was the place where the market was held. Towards the end of 1886, Osman Digna having confiscated all the merchandise for the benefit of the Beit el Mal (treasury), the road to Tokar was abandoned, and what little trade there was passed through Falkat to Kassala, trusting to the word and to the invitations of the new Governor, Abu Girga. For some time trade was reanimated, thanks to the protection given to the merchants by Abu Girga, who had appointed a representative for the Massawa merchants, and the textures came to be exchanged almost exclusively for money or gum, as the supply of ivory that used to come from the interior failed, and now all cultivation of cotton and tobacco had ceased. The occupation of Keren by the Abyssinians brought the Falkat road into favour, also perhaps for the facility that it lent to the slave trade with the Arabian coast from Taklai.

In 1888 the Emir Abu Girga was superseded in the command of Kassala by Ahmed Ali, who, from the very first, showed himself inimical to any trade, and so some of the merchants followed Abu Girga to Tokar, and some returned to Massawa, having almost invariably lost. For two years they held no further commercial relations with Kassala or the other Dervish provinces.

However, the Keren and Kassala road was guaranteed by the victory of the 16th June, 1890, and by the building of the fort of Agordat, and also by our system of recruited irregulars and protected tribes that sought the shelter of the fort; and so our merchants made up caravans and sent them to Kassala, where Abu Girga had returned as Governor.

On their side, the Dervishes had begun to send to Keren and Massawa petty traders, generally Hallenga or Hadendoa, and so by degrees a trade revived, which, if not important, was certainly continuous, exchanging our cotton goods, soap, and glass ware for gum, ivory, and occasionally gold dust or dollars.

Musaid Gaidum being appointed Governor of Kassala, it seemed for a moment that all trade must cease, considering his antecedents (the destruction of Dongola), and also his origin (Baggara), and that he was appointed as a proved fanatic, and as inimical to any dealings with the Infidels. But even he, as his predecessor, sent guarantees to the merchants of Keren and Massawa, and trade continued as formerly, and was not interrupted even by the action of Sorobeti.

Only quite recently the very Khalifa himself, through an ex-representative of some of our merchants, sought to sell a parcel of ivory that was forwarded from Khartum to Kassala. On this subject Musaid Gaidum wrote to the Governor of the colony and to the chief merchants in Massawa in the month of June, 1893, and in September an order of the Khalifa was published to keep open all roads to Italian trade.

But the Mahdi hordes camped on the frontier, and when the opportunity came, when want came, when they chose to believe it was the call of God, they rushed forward to battle without giving a thought to our previous relations and to our trade, without an after-thought, without even going through the form of declaring war.

The inspiration of the Mahdi or the caprice of a leader, and a storm bursts over some particular point of the horizon—the tempest subsides, and they will once again fall into their old methods of trade.

And so, shortly before the outbreak of these last hostilities, about 20 cwt. of ivory arrived at Massawa, and the Emir Ahmed Ali during his advance found one of our merchants close to Gedaref, on his way into the interior with much goods, which had been confiscated by the advance guard, and to whom he returned everything, assuring him he could proceed fearlessly, and even after the action of the 21st December a caravan of Kassala merchants, that was on its return journey from Massawa, left Agordat for the interior, and announced that one of our brokers was on his way from Gedaref.

An Emir enters into commercial negotiations; suddenly come unexpected orders from Khartum for a radical change of policy, and a raid or a campaign is the result. In our case, after 18 months absolute tranquillity and thriving trade with Kassala, after the protestations of Musaid Gaidum, and his amiable overtures to the brokers of Massawa, after the expressed desire of the Khalifa Abdulla to sell to

Massawa part of the Beit el Mal (public treasury), suddenly Ahmed Ali and the Gedaref army appear on the scenes, and without more ado precipitate themselves on Agordat.

AGORDAT.

The fort of Agordat is built on a hill, on the left bank of Khor Baka, in a position that commands a series of slopes which lend themselves to its defence; it has a fair field of vision, and a good field of fire, and is close to the wells which have been sunk in the bed of the Khor.

It is two short days' journey from Keren, and four from our frontier, and to its rear there are several roads to Keren and Asmara, on which water is to be found. Its position was chosen by General Baratieri in 1890, to protect the road from Kassala and as a defence against the inroads of the Dervishes, being a point that all must pass to reach Keren. It was the garrison of Agordat that defeated the Dervishes at Serobeti, and it was with the support of that fort that we gained the victory of the 21st December, 1893.

Agordat stands at the bifurcation of the two main roads between *Keren and Kassala*. One is the southern road that passes through Bisha and by the mountains of Algeden and Sabdarat, and the other is the northern road through Degi and Hawasheit, each comparatively easy and with water. The two roads are in a manner parallel, and connected together by several cross-roads.

Agordat effectually commands the back roads to Keren, and also—
1st.—The road through the bed of the torrent Sabre Iscorum to *Bab-Gengherem*.

2nd.—The road through the valley of Megilel, of Aful and of *Alfarom*, leading into the basin of Keren.

3rd.—The main camel road through Adarte or through the Bogu valley to the same objective.

4th.—The Khor Barka road through Damba, Mansura, and Khor Shotel.

On the Organization of the Dervish troops prior to the September of 1893.

The Dervishes had hitherto had ready for war four great army corps :—

One in Dongola under the command of Yunes ed Dekeim, that watched the frontier of Upper Egypt.

The second that of Gedaref stationed on our border, and that also of Abyssinia.

The third and fourth commanded by Ibrahim el Khelil and Mahmud Ahmed respectively, engaged in Kordofan.

In the Dervish army they have the following grades :—

Mukaddem corresponds to the rank of subaltern officer.

Ras mia, the commander of a hundred.

Emir Raia , , banner.

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There are many Emir Raia, however, that have under their command a considerable number of banners. Sometimes some dozens, and subordinate to them are other Emir Raia, each in command of a banner—

Emir Rub the commander of $\frac{1}{4}$ th of an army corps ;
Rais Gaish, the commander of an entire army corps ; each army corps may amount to several thousand men.

It is divided usually into four Rub ; each commander of a Rub has under him so many Emir Raia, and the most influential of those, in their turn, command other Emir Rais of inferior grade.

The Army of Gedaref was armed with 8,000 Egyptian Remingtons (of which 1,700 had bayonets), kept in an excellent condition and well supplied with ammunition. Only these 1,700, which were carried by the personal bodyguards of the Rais Gaish, were always supplied with cartridges. The bulk of the ammunition was stored in the dépôt of Gedaref under the custody of a strong guard. Very severe discipline was enforced. The soldiers received no pay, but every twelve men were rationed with one ardeb (97 lbs.) of durrá for the month. They were not supplied with clothing, but from time to time shirts were doled out to those most in need. The Gedaref force had four field-pieces, but two had been sent away to Khartum ; they were kept in a very good condition.

KASSALA.

In Kassala there was a Civil Governor, Musaid Gaidum, who was also Rais Gaish for the small garrison, and had at his command about 1,500 rifles, of which 1,200 were Egyptian Remingtons, and some 300 muzzle-loaders of various patterns. Of all these only 240 were permanently distributed to Musaid's personal bodyguard, the remainder were stored in charge of each Emir Rub. All the bodyguard is not kept permanently under arms, but only about 60 men in reliefs.

In Kassala there are two cannon in a wretched state. The Egyptian walls built of sun-dried bricks (with towers at the angles) have fallen in, and show great breaches, and the ditch is in a very doubtful condition.

Colonel Arimondi's Report to H.E. the Minister of War on the Operations against the Dervishes in the Barka District in December, 1893.

Massawa, 10th January, 1894.

About the end of November the political situation of the colony, internally as well as externally, seemed to be, as usual, quite undisturbed ; tranquillity reigned throughout the colony, though the Assaorta had been but shortly before disturbed by a raid of little moment, and as quickly suppressed. From Abyssinia we received continuous protestations of friendship and good faith, for the Ras of Vigré was extremely desirous of obtaining our support that he might

triumph over the internal crisis that was passing over his dominion and the perils that continuously threatened him from outside.

In the Sudan there had been for some time a marked wave of popularity in favour of the Italians. The Khalifa Abdulla and Musaid Gaidum on several occasions had expressed their desire that the trade roads to the Italian colony should remain open, and they had assured our merchants of their countenance and protection. Moreover, in October tidings had reached us of a sudden disaster to the forces of the Khalifa in Kordofan at the hands of the new Mahdi Farag el Meskin, so we had reason to suppose that, this year at least, the Khalifa would have directed all his efforts, rather than otherwise, to the liberation of the Emir Mahmud Ahmed, who, it appears, was closely blockaded in El Obeid. But withal, well knowing the capriciousness and the misguiding artifice of the Dervishes, the Government of the Colony kept on the alert, and with a special Intelligence Service no movement of importance was likely to escape their notice.

And so it came to their knowledge, the downfall in disgrace of the Emir Ez Zeki Tummel, his recall to Khartum, and finally his execution with several of his more devoted followers. The cause of Ez Zeki's downfall was the Khalifa's apprehension that he might throw in his lot with the rebels, and also his desire to put his own relatives at the head of the more important administrations. The Emir Ahmed Ali was appointed Ez Zeki's successor, a good administrator but a leader of little fame, so that his nomination seemed to give a fresh guarantee of tranquillity for the colony. Then it became known that a section of the Gedaref force had been ordered to Khartum, and rumour said, with the intention of sending reinforcements into Kordofan; again later the same Ahmed Ali was invited to repair to Khartum, whilst all his troops remained concentrated at Gedaref. Then were rumours first afloat of possible operations against the Infidels—vague and indefinite at first, and they did not seem worthy of more credence than those we had heard in previous years from the merchants of Kassala and Keren.

In the beginning of December these rumours crystallised and became more determinate. In the absence of the Resident of the Barka province, the officer commanding at the fort of Agordat sent in information that Ahmed Ali had arrived at Gedaref, and that he had announced to his troops that they were to prepare for an advance against the Italians. In the preceding year the same troops, then under El Kaki, had been massed at Gedaref for the express purpose of moving against Agordat, but instead, a few days later, they were despatched to Gallabat.

The critical balance of Mahdiism in the Sudan and the habitude of the Dervishes of affecting to be marching against one enemy and then suddenly attacking another, made us doubt if this might not be such a similar feint, and that in a brief period the Gedaref army might disappear to operate in the interior.

Nevertheless, it would not be prudent to neglect elementary precautions, and the Government of the Colony, whilst supplementing the

Intelligence Service and insisting on an ever watchful vigilance, also sent forward an additional native company from Keren to Agordat, and directed Lieut.-Colonel Cortese, the commandant of the Keren Zone, to leave immediately for the Barka province, and with a good show of troops make an excursion towards Mogareb, either to reassure the inhabitants or with the idea that the report of the presence of our regulars in Mogareb might perhaps influence the Dervishes, and even bring them to renounce any contemplated enterprise against our dependencies.

On the 11th of December, the reinforcing company from Keren reached Agordat, and the Barka company of auxiliaries, under the command of Lieutenant Olivari, watched with his main body the line of heights between Dege and Mogelo, and pushed forward on the main lines of communication with Kassala, posts of observation up to three days' march beyond Agordat. On the morning of the 11th, we had the news confirmed from all sides of the arrival of Ahmed Ali on the scene, and that he had committed himself to an advance as soon as possible; but as yet neither our spies nor our vedettes detected any forward movement from Kassala (not even those cavalry pickets that so usually herald an advance). The Government of the Colony that morning ordered that all the troops garrisoning Keren, the Asmara squadron, the 2nd mountain battery, the two companies of the Asmara garrison, and the company detached at Az-Teklesan, should be mobilized. It was, moreover, settled that on the advance of the Dervishes, the Barka auxiliaries should harass their advance, without, however, committing themselves to an engagement, and, when driven back, should incline towards Agordat, making a junction with the garrison of the fort, and at the same time should hinder the digging of wells, destroying all those existing that would not be of service to us. The officer commanding the Keren Zone had, moreover, to revictual and munition the fort of Agordat to fully meet the requirements of the troops detailed to operate in the Barka. By these arrangements, under the three days we could concentrate at Agordat 7 companies of infantry, 2 squadrons of cavalry, 2 batteries of artillery, and the 3 bands of Barka auxiliaries, whilst the Dervishes were still at Kassala—a good five days' march from Agordat.

We calculated that the Gedaref army had reached Kassala probably complete, and to this would be added the Kassala garrison, but that neither Osman Digna nor Ez Zaki Osman, the Governor of Berber, would have contributed any contingents, that being quite opposed to their usual methods; therefore the force that Ahmed Ali would have available could be returned at about 10,000 men, 6,000 to 7,000 rifles, and 500 to 600 cavalry. On the 12th, the situation remained unchanged. On the 13th, people straight from Kassala announced that the advance originally arranged for the 10th had been definitely fixed for the 12th. Osman Digna was still at Adarama, on the Atbara River (four days' march from Kassala).

The projected excursion to Mogareb, therefore, appeared useless, and Lieut.-Colonel Cortese was ordered direct to Agordat with his troops, where he was to assume the command. On the 14th, the

officer commanding at Asmara was ordered to send forward to Agordat by the Ferfer route two companies and the Asmara squadron, and to push on the 2nd battery of artillery to Keren. At the same time a company left Saati for Keren by the Maldi road. All troops to carry six days' rations for man and beast. On the afternoon of the 15th I left Massawa *en route* for Agordat to assume the supreme command. On the afternoon of the 15th I heard by telegram from Lieut.-Colonel Cortese, just arrived at Agordat, that the Dervishes were advancing in two columns, one by the Gash-ed-Eimasa, and the other by Anashait, and that they were already half-way from Kassala to Agordat.

In all they numbered over 12,000 men. He asked that all detailed troops should immediately concentrate at Agordat. Although this intelligence seemed scarcely probable, or at least exaggerated, I ordered the officer commanding the 2nd native battalion to proceed immediately from Keren with the last company left there, and the officer commanding the detachment at As Telesan to start immediately for Keren. So, on the morning of the 16th, the situation was as follows:—

Our vedettes two days beyond Agordat. The main body of the auxiliaries and the Keren squadron on the line Mogelo-Shaglet-Degi. At Agordat the 2nd battalion and the 1st battery. At Keren two companies, the 2nd battery of artillery, one company cacciatori (Italians); detachment of garrison artillery, engineers, ambulance, and commissariat. The troops *en route* from Az-Teklesan.

On the 17th the column from Asmara by the Ferfer road arrived at Agordat.

I arrived at Keren. Intelligence had been received that day of the advent of a few Dervish cavalry at Hawasheit and Kheru. But no information of the Dervish column on the Gash road; therefore probably the entire Dervish force had all taken the caravan road.

On the 18th, about 7 A.M., I left Keren with a native company, and ordered forward another company from Arkiko to replace them.

Seeing that our detachments on the lower Barka and on the Anseba were still at their stations, and that Osman Digna was reported to have not moved from the Atbara, I ordered forward the 2nd battery and the native company, still left at Keren, to prepare to move at a moment's notice.

At Adarte I heard that at 4 A.M. the Dervish vanguard had reached Daura; that their fires were seen in the Andellait Valley, and that they had most probably resumed their march in the night through Khor Baria, and would be at Mogareb or Kufit next morning. Our irregulars covered the heights between Bisha and Mogelo.

Still no reports of the Dervish column on the Gash road. It was therefore evident that both columns had merged into a single column on the one road.

I therefore telegraphed instructions for the Keren squadron and the native auxiliaries to harass the enemy on the march, without being drawn into an engagement, but to keep touch with them; and I telegraphed to Keren to push forward the 2nd battery and the

native company to Agordat. I also telegraphed to our resident at Saganeti to advance immediately with the Okule-Kusai auxiliaries through Asmara, where they would be joined by a company of the 3rd battalion. Assuming the direct command, I detailed the divisional commands and their supplies, made the dispositions to meet the Dervish attack, strengthened the position, organized a vedette service with posts of observation on the heights overlooking the approaches from Tukulai, Shaglet, and Hambul, and filled in the Ashai wells, for which the Dervish column would most probably make on advancing from Kufit; and I sent urgent demands to Keren for provisions and ammunition.

On the 19th I heard from Captain Carchidio, commanding the troops to our front, that the Dervishes, after turning with their cavalry the position at Bisha, had reached Kufit: he with the auxiliaries and his squadron still held Shaglet, and was striving to gather more precise details of the enemy's force, and to make some prisoners.

In the afternoon there was an exchange of shots near Shaglet between the Dervish cavalry and our pickets. In the night we got notice that the Okule-Kusai auxiliaries and Captain Persico's company had left Saganeti, and should be due in Agordat on the afternoon of the 21st.

On the morning of the 20th the Dervishes advanced slowly on Shaglet; our cavalry and auxiliaries, after some slight skirmishes, retired on Khor Akbermann. The Asmara squadron was sent forward to El Asciani, and there found the Dervish cavalry, and, closing in on them, exchanged shots.

In the afternoon the Dervishes advanced on Ashai. I ordered the cavalry and the auxiliaries to retire on the fort for their needful rest. To keep touch with the enemy, I pushed forward Captain Catalano's company 2nd/II with instructions that if he saw an opening in the night he, with a *coup de main*, was to try and make some prisoners, as we wanted more detailed information as to the Dervish force and its intentions. At sunset, the cavalry and auxiliaries arrived at the fort, also the company and the battery from Keren.

In the night I heard from Captain Catalano that the Dervishes were camped in one great zariba, close to Ashai; to make any prisoners was quite impossible, but there was every indication that the Dervishes would move to the attack on the following morning.

I sent to urge forward the convoy of munitions, at the same time sending back both squadrons of cavalry and the Barka auxiliaries to El Gaga to cover their advance.

I also warned Captain Persico that the engagement would most probably be on the following day, and he must strive to arrive in time.

At 1.30 A.M. Captain Catalano's company fell back, and, shortly afterwards, our signal station reported that the Dervishes were on the move.

At 7 A.M. the convoy of munitions arrived. The officer commanding the detachment at El Gaga was instructed to withdraw on the fort when he saw his communications threatened.

About 9 A.M. the Dervishes broke into view on the right of Khor Barka. The lay of the ground prevented any estimation of their numbers, but it was evident they were in great strength.

About 10 A.M. both squadrons and the auxiliaries, to avoid being cut off from the fort, retired from El Gaga on the villages of Ad Omar.

At 11 A.M. a strong Dervish column, passing about 3 kilos. north of the fort, moved from El Gaga to the bifurcation of the Khors Kar Obel and Barka, and cut our telegraph wire.

The 2nd battery stationed in the fort was ordered to open fire on the Dervish column.

The fire of the battery was kept up at intervals till the Dervishes, breaking into a run, crossed Khor Barka and reappeared behind the village of Algeden (which bears east of the fort). The 1st battery, which was aligned along a spur of the heights to the south of the fort, also opened fire on the Dervishes as they crossed Khor Barka.

The squadron of cavalry and the auxiliaries, keeping up a desultory fire, retired under the fort.

Our troops were drawn up on a line of low hills due south of the fort, and separated from the fort about 250 m. by a low saddle.

The natural front of the position faces to the west, from which direction we expected the attack; but the position was equally effective if the attack came from the east, as in fact happened, when the Dervishes marched on the villages of Algeden and Sabderat due east of the fort.

At 11.30 A.M. our troops were drawn up as follows:—

On the hill to the south of the fort (right wing). The battalion commanded by Captain Galliano, composed of the companies—

1st/III, 3rd/III, 1st/IV, 3rd/IV, and the 1st mountain battery (4 7-cm. guns).

In the fort the company—

3rd/II and the 2nd mountain battery.

Covering the wells, the company 4th/II.

In reserve, near the saddle, companies—

1st/II, 2nd/II, the Barka auxiliaries, the Asmara and Keren squadron of cavalry.

The Dervishes first attempted to gain the Sabderat Wells, and being harassed by our artillery fire, scattered through the two villages, and gave no indication of an immediate attack.

From the moment that I had decided to concentrate the troops at Agordat, I had fully determined to make the utmost of every advantage that this naturally strong position presented; well provided with water, and commanding the junction of all roads to Keren, and I intended to await the attack there if the Dervishes took the initiative. This they did not seem disposed to do, and we would

have been taken at a great disadvantage, as the superiority of our fire would have been neutralized, if the Dervishes attacked us under cover of night.

Although Captain Persico's column had not as yet appeared, still it was probably not far off, and action being decided on, now was the opportune moment to attack, whilst the Dervishes were exhausted by their long and forced march, and had neither rest nor water, and were broken up and disorganized raiding in the villages. And further, I wanted to make the most of the marked exhilaration of our troops, which might evaporate away if they were kept inactive, facing the enemy at such close quarters.

At 12.15 P.M. I ordered Lieut.-Colonel Cortese, commanding the right wing, to advance and attack the village of Sabderat with four companies and the 1st battery, and Lieutenant Giraud with his company 1st/II was to occupy the ground vacated by Lieut.-Colonel Cortese.

When I saw the movement initiated I sent Major Fadda forward with the company 2nd/II (Captain Catalano) with orders to extend on company 4th/II (Captain Oddone), and advance between the bed of the khor and the right wing, conforming to the movements of the latter.

The 2nd battery from the fort was, if within possible range, to open fire and prepare the attack.

The right wing advanced in columns of companies 3rd/IV, 3rd/III, 1st/IV, and supported about 330 m. in rear by the 1st battery and 1st/III (Captain Forno).

After making a brief pause on the Damtai the columns advanced as far as the Inkierai, where they were extended.

Meanwhile the company on the left 1st/IV crossed over the bed of the Inkierai, but seeing that they were within 700 to 800 m. of the enemy and unsupported, I withdrew them to the left bank of that khor.

At 12.30 P.M. the 1st battery, having taken up position in the rear of the battalion, opened fire.

The infantry also gradually commenced firing.

On the left centre Major Fadda advanced with company 4th/II through the date palms, and the 2nd/II company extended between the palms and the right wing, and on finding himself in front of the Dervishes opened fire.

The Dervishes, becoming sensible of our attack, rallied round their standards, and soon returned our fire with energy; and then in a dense mass they advanced resolutely and rapidly, the weight of their onslaught being directed against our right wing and the 1st battery, and their cavalry threatening to turn our right flank.

Their impetuous onslaught was only for a brief period checked by our battalion, which was gradually forced back by the overwhelming numerical superiority of the enemy, though they vainly strove by counterstrokes to give the battery time to retire.

The battery finished with four rounds of case, the last fired at a range of some 50 paces, and they then endeavoured to get the guns

on to the mules, when these were all killed, and so rapid and determined was the rush of the Dervishes that the guns had to be abandoned, 12.50 P.M.

The right wing, although pressed hard by the enemy, gave ground slowly, step by step, keeping up a murderous fire, till they were forced back across the bed of Khor Damtai.

Major Fadda's two companies after fighting stubbornly with the Dervishes, and making repeated counter-attacks to check their advance, were, on seeing that the right wing had given way, eventually forced to retire.

The 2nd battery from the fort had meanwhile rendered material assistance, but had failed to check the advance of the Dervishes.

About 1 P.M., seeing that the enemy's rushes had become less determined, I thought that now was the moment to push forward the reserves and support. On the right wing I advanced the 1st/II company, supported by both squadrons at the bottom of the valley, the ground there being more suited for the action of cavalry. The appearance of these fresh troops reanimated the battalion, and gave a new turn to the battle. Twice they advanced to cross the bed of the Damtai, and at the second essay they succeeded in winning the right bank; and then they began steadily to gain ground, slowly at first, then more rapidly.

In support of the left wing I advanced the 3rd/II (Captain Grossi) with orders to align on the right wing. Major Fadda now reformed his two companies. The 2nd/II he extended on the left flank of the 3rd/II, and the other he held in reserve.

Before this resolute attack the Dervish right wing also began to waver—then to give way. The guns of the 1st battery were retaken, fresh impetus was thus given to our troops, and inclining to the left and pressing hard on the enemy they drove them back across the bed of the Barka in utter rout, which at once became headlong flight (2.20 P.M.).

The 2nd battery, with a well-directed and sustained fire, rendered invaluable assistance throughout the action. Lieut.-Colonel Cortese rapidly re-formed the troops, and with six companies 1st/II, 2nd/II, 4th/II, 1st/III, 3rd/III, 3rd/IV pressed after the enemy, but failed to come up with him.

At sunset Captain Persico's column arrived; they, not having heard the firing, had halted two hours at Demba for rest.

Our losses were 2 Italian officers and 1 non-commissioned officer killed, 2 officers and 1 non-commissioned officer wounded, and about 230 natives killed and wounded. The enemy left on the field about 1,000 dead, and we took 72 banners, 1 machine-gun, and about 700 rifles.

From the last accounts gathered from our spies that left Kassala on the 4th of January, their total loss was about 3,800 men, including Ahmed Ali¹ and the four Emir Rubs. Later, and trustworthy information, computed their loss at 3,200 killed, lost, or prisoners. In

¹ Ahmed Ali, who was clad in glistening chain armour, was struck full in the face by the base of a case shot, one of the last rounds fired.

Kassala there were many wounded, amongst them Musaid Gaidum and the Emir Faragalla¹ who had acted as guide.

The action was fought under favourable conditions to us, as I had desired and foreseen. The support of the fort was of undeniable assistance, both moral and material, the entire Dervish force had been beaten in one coup, and at 150 kiloms. from their base.

To get back to Kassala they had to traverse a country but little known to them, deficient in water, barren of cattle or food of any kind, and sown with perils for the laggards or stragglers; and they would have had great difficulty in escaping the ambushes that would be laid for them at every place and at all times by the tribes that they had invaded and overawed, and whose turn for vengeance had now come.

Granted that the disaster to the Dervishes and their loss, both on the battlefield and on their line of retreat, might have been greater even without the direct pursuit of our troops, still their flight was so headlong that we lost touch almost immediately of the main body of the enemy.

It certainly would have been to our advantage if the Gedaref army had been annihilated at Agordat, thereby indefinitely postponing a grave menace to the colony; or even, could we have overtaken their main body and renewed the action, we might have been able to destroy it, or forced it to surrender.

All our troops that had concentrated at Agordat had made long and exhausting marches from distant points, and for days prior to that of the engagement had been employed, some on outpost and escort duty, and others entrenching the position.

The action and the pursuit, extended over a period of five hours, had greatly exhausted the troops, and they were hardly equal to any further efforts; for even Captain Persico's column had covered over 150 kiloms. under 40 hours. Moreover, they could not have advanced without food and a fresh supply of ammunition; transport would have to be provided, and depôts established along the line of operations, and the wells destroyed prior to the Dervish advance would have to be re-dug; in short, the column would have to be provided with all necessaries for several days' march across a country barren of every resource; it was, therefore, hardly possible to enter on the pursuit till the morrow.

The Dervishes had lost their natural line of retreat, and to get back to Kassala they must either have regained the road that they had advanced by, with the self-evident danger of being crushed against the heights of Itaberri, or make a long detour through Khor Hademdem, and from there to Hawaisheit; this was the most possible conjecture, and, our outposts having been re-established, I trusted to get information early in the night.

Feeling confident that the Dervishes were bound to make for Hawaisheit eventually, I determined to try and forestall them, taking the road through Bisha and Daura.

¹ Gordon's old commandant of Omdurman Fort, who, at Gordon's order, surrendered to the Mahdi when his provisions were exhausted.

On the morning of the 22nd, having arranged for the transport, and the troops being now thoroughly recuperated, I gave orders for the advance.

The vanguard was to keep about two hours' march in advance of the main body; it consisted of one company, the 4th III, and the auxiliaries. Captain Spreafico was detailed to cover the right flank, and to search for the enemy towards Degi and Khor Hadem-dema.

In the evening the vanguard reached Bisha, and the main column camped at Kufit.

The main body of the Dervishes was not sighted, but captured prisoners acknowledged that the mass were disorganized, and in full retreat on the Hadem-dema and Hawaisheit road, under the Emir Abder Rasul.

On the following morning the pursuit was renewed, and throughout the day gunshots were heard from all sides, probably fired at Dervish stragglers by the local tribesmen. That evening the column bivouacked at Doura, and the vanguard at Mogal.

There they had confirmation of the demoralization of the Dervish force, that the mass of them had already gone beyond Hawaisheit, and that by the evening even the stragglers would have passed through.

If this was correct, we could not now come to terms with the enemy; however, I ordered the vanguard to push on that night to Hawaisheit, and there effect a junction with Captain Persico's other half company, and to the latter I gave the command of this covering force. The information of the previous evening being confirmed, I decided to fall back on Agordat in three columns, at intervals, the last of which arrived there on the evening of the 26th. I now arranged for the re-establishment of the frontier posts, and I sent spies to Kassala and Gedaref.

The fort of Agordat was well supplied with provisions and ammunition, and I left two companies there; the remainder of the troops I sent back to their respective cantonments.

This was the third time that our troops had measured strength with the Dervishes [Itaberri (Agordat), Serobeti, and now at Agordat again], and they had always come out victorious.

In the first two they had only to grapple with an enemy badly organized, and in no formation, retiring after successful raids, which gave their columns rather the appearance of caravans than that of organized troops, but this time the conditions were very different.

The Gedaref army, which had been for some years under the command of Ez Zeki Tummel, was well armed and well disciplined, and had been inured to battle, fighting first the Abyssinians, and later they had been employed for nearly two years against the Shilluk; it included a great number of old Egyptian soldiers (Jehadis), and it had for leaders some of the most famous Emirs, to wit, Abdulla Ibrahim, formerly colonel in the Egyptian Sudan Army, and Abder Rasul, formerly a bimbashi in the same force.

The Gedaref army was divided into four rabs of unequal strength,

commanded by the Emirs Abdulla Ibrahim, Abder Rasul, Abdulla Daggash, Ed-Daga-Ahmed, and to this force was added the garrison of Kassala, led by the Emir Musaid Gaidum.

The Emir Ahmed Ali, nephew of the Khalifa Abdulla, was in supreme command.

From Kassala the Dervish advance was in one solid column, and they moved with but little impedimenta, merely their reserve ammunition and a limited supply of provisions; at first their advance was slow (as they had to send men forward to dig wells), afterwards they moved with greater rapidity.

Their stages were:—Algeden (15th), Khor Basha (16th), Hawaisheit (17th), Daura (18th), Kufit (19th), Ashai (20th).

They moved always in a dense but orderly formation, with one rub some hours in front as an advanced guard, and this would have its front and both flanks covered by detachments of cavalry and fast camelry scouting.

These would not be drawn into an engagement, and when pressed would retire on the infantry. A vigorous discipline was maintained in the Dervish army, and the proof was that they were able to prevent all straggling or loitering on the march, also by the symmetry of their camp, the enormous zariba constructed in the one night at Kufit, and the fact of their not having burnt a single tukul even of the villages passed on the line of march; they did not commit any act of violence of rapine.

With skill they avoided a front attack on the position of Agordat, and made a detour round it clear of gunshot range, they cut our line of communications, reckoning that they would either attack us under the most favourable circumstances or force us to a surrender for want of supplies.

We gathered from prisoners taken that the Dervishes engaged amounted to about 12,000 men, 8,000 with rifles, 3,000 spearmen, and 500 to 600 cavalry.

At Agordat, when they saw us moving to the attack, they rallied round their banners and then deployed, covering a line about 2 kiloms. in length, with their cavalry on their left flank, and their banners clustered in groups to their front.

One rub advanced through the date palms in the khor, and the other rubs against our right flank; they came on in a dense line to the beating of drums and kettledrums, firing as they advanced without pausing; their leaders, mounted, well to the front, giving striking examples of recklessness and courage.

If our troops had been drawn up in any dense formation, the shock would have been very serious, if not disastrous. Familiar as they were with the massed Anglo-Egyptian formations, the elasticity of our lines, so slight but so deadly, must have been a new experience for them; before it their well sustained attack began to lose its intensity, then to waver, and finally to die away. The death of their leaders, the deadly effect of our fire (acknowledged by all our prisoners), and the opportune appearance of our reserves, to meet whom they had no fresh troops to bring forward, as they had engaged

their entire force, compelled them to retreat, which, when they had crossed Khor Barka, became a pell-mell flight.

The Dervishes were mostly armed with Egyptian Remingtons, kept in excellent order, they were well supplied with ammunition (on many of the dead were found as many as 120 cartridges), re-loaded cartridges certainly, but infinitely superior to what they had used in the previous engagements of Agordat and Serobeti.

Their fire was undoubtedly very ill-directed, even at the close ranges, as they were quite untrained in fire drill.

For our native troops this engagement of the 21st December was a convincing proof of the magnificent military qualities with which they are endowed, and the success of our system of training. The infantry proved that they had reckless dash in the attack, steadiness and energy, even at the most critical period of the retreat, ability and nerve under fire, and an absolute faith and devotion to their officers.

That the artillery contributed to the attainment of the victory is undoubted, but when one takes into consideration the smallness of the calibre of the guns, the broken ground, and the formation of the enemy, the effect was more moral than material, and the captured prisoners endorsed this.

The cavalry had been much exhausted by the vedette work on the preceding days, also the cramped nature of the battlefield gave them but few openings for fulfilling their rôle, but as soon as the scene of action was shifted to the lower ground they played their part as gallantly as the infantry.

The Barka auxiliaries carried out admirably the Intelligence Service assigned to them; but when in contact with the enemy they, though not wanting in dash, showed but little discipline. All the officers, without exception, gave constant proof of courage, intelligence, self-sacrifice, and a prompt and zealous initiative; moreover, they proved that they had acquired the absolute confidence and affection of the Askari, and had such ascendancy over them that they could hold them in hand, not only in the rush of the assault, but in the more crucial test of the retreat.

And, therefore, although limiting the issue of silver medals to the divisional commanders, and to those others that come under the conditions contemplated in the present regulations, I have ventured to submit the names of all the officers for some recompence; for although many cannot be singled out for special actions, yet all, however, have proved themselves well worthy of individual distinction.

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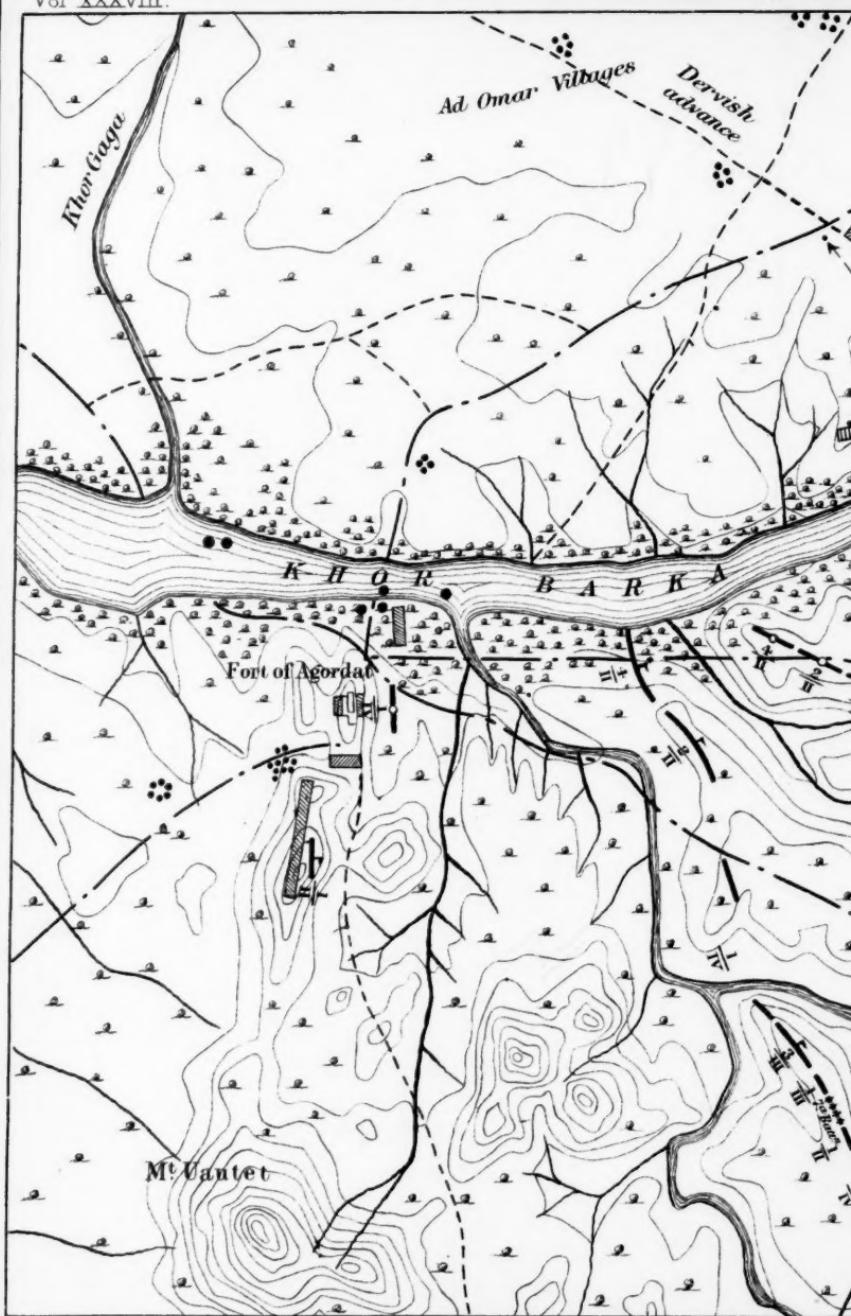
Forces present at the Battle.

	Italian.			
	Officers.	Non-com. Officers.		
2nd battalion of native infantry	14	7	736	757
Mixed battalions, 3rd and 4th	15	6	703	724
Asmara squadron of cavalry	4	5	114	123
Keren	2	4	95	101
1st native mountain battery	3	6	100	109
2nd " "	3	5	108	116
The Barka auxiliaries	1	—	250	251
Total	42	33	2106	2181

Killed : Italian officers 3
 " Non-commissioned officers 7
 " Native troops 104
 Total 114

Wounded : Italian officers 2
 " Non-commissioned officers 1
 " Native troops 121
 Total 124

ACTION OF AGORDAT (21ST JUNE)



(21ST DECEMBER, 1893.)

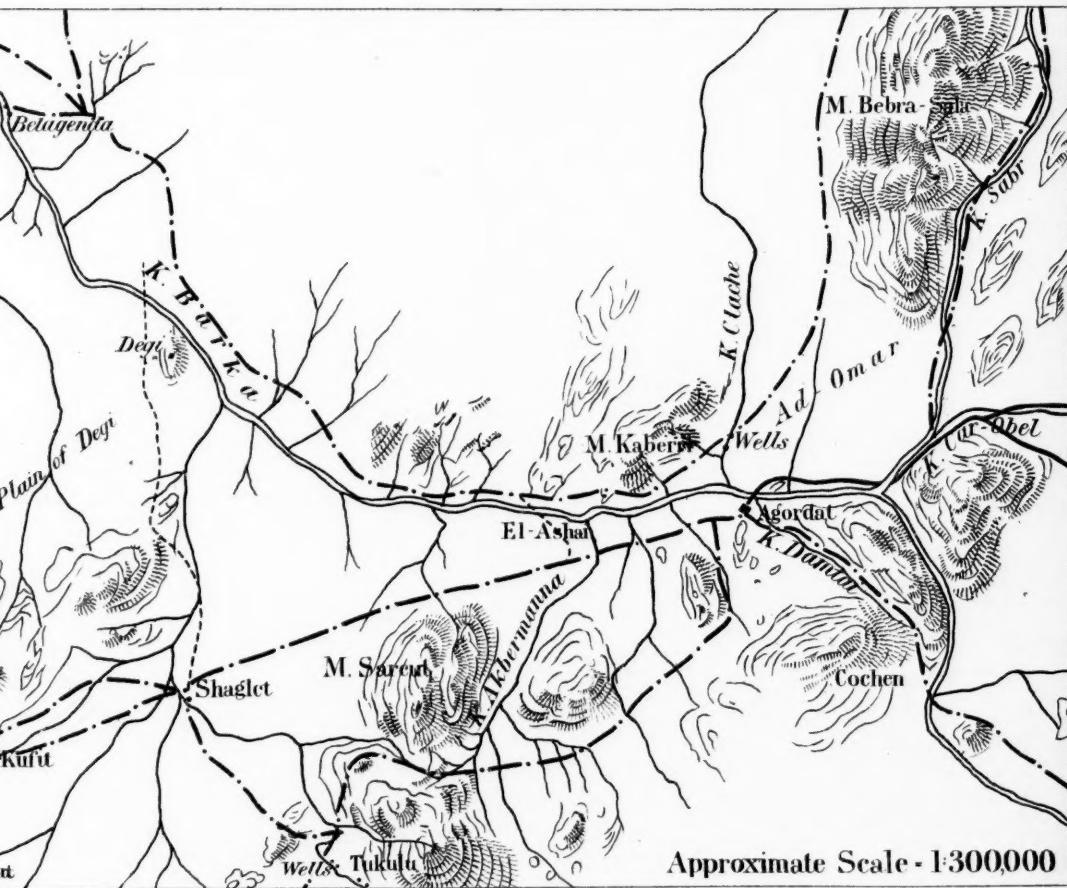
Plate 39.



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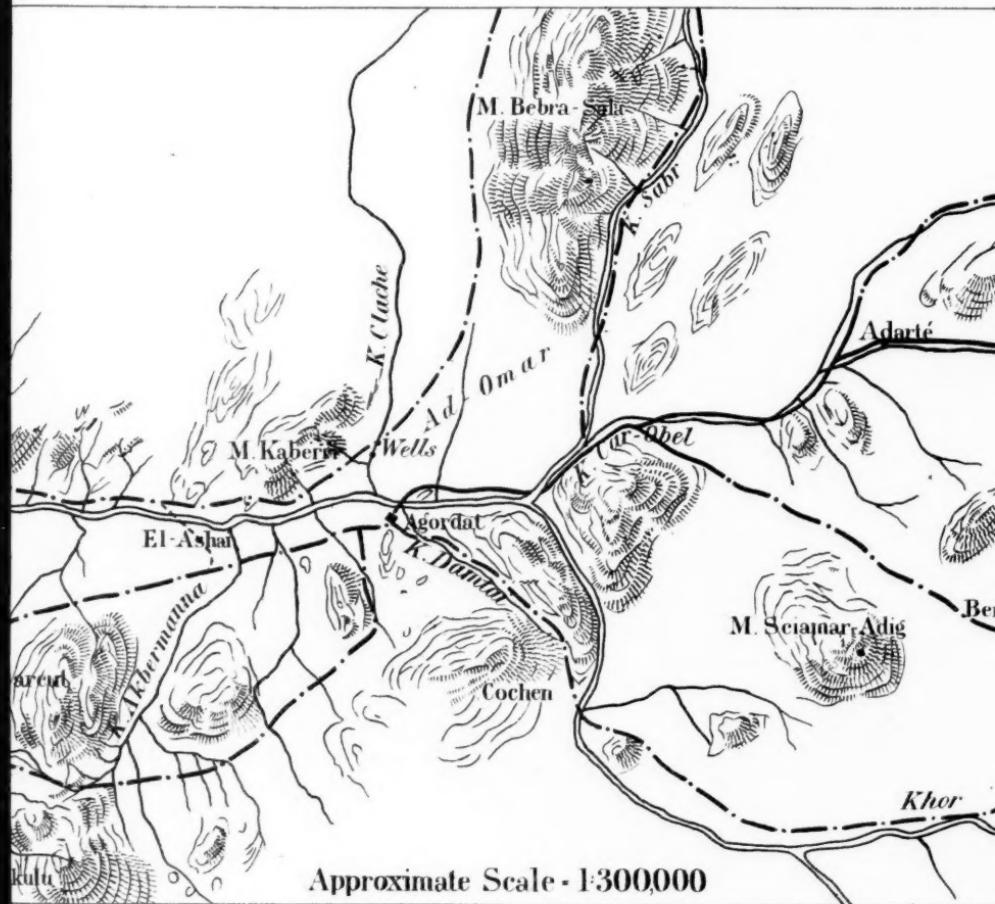


THE OPERATIONS AGAINST THE DERVISHES - DECEMBER 1885



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S AGAINST THE DERVISHES - DECEMBER. 1893.



Approximate Scale - 1:300,000

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Plate 40.



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NAVAL AND MILITARY NOTES.

NAVAL.

Home.—We deeply regret to have to record the death of Captain T. F. Hammill, C.B., R.N., who passed away on the evening of Sunday, the 1st July, at his residence at Alverstoke. Captain Hammill attained the rank of captain at the exceptionally early age of 34, but he had a distinguished career, and his rapid rise in the Service was due as much to downright hard work as to his exceptional abilities. He served during the Egyptian war of 1882, and in the Soudan expedition of 1884-85 for the relief of General Gordon, in which he rendered invaluable services with the Nile flotilla in surveying the river cataracts and in connection with the passage of the steamers and generally of the river transport. By his premature death the country has lost a most promising officer and the Service one of its members, whose memory will long be affectionately treasured by numerous friends and shipmates of all ranks. The remains of the deceased officer were interred at Alverstoke, with full naval honours, on the 5th ult., over 170 officers taking part in the funeral *cortege*, which included among others the Naval Commander-in-Chief and the General commanding the district.

The following are the principal appointments which have been made:—Captain J. Ingles to be Superintendent of Gun Factories at Woolwich; Commander G. Leckie to "Swallow." For the Manœuvres: Rear-Admiral E. C. Drummond as second in command to Rear-Admiral Seymour, C.B., to command the D Fleet; Captains—H. Pearson to "Barfleur;" F. Boardman to "Conqueror;" W. H. St. Clair to "Theseus;" A. K. Bickford to "Gibraltar;" E. S. Poe to "St. George;" H. Dyke to "Andromache;" A. C. Corry to "Apollo;" A. C. Bromley to "Brilliant;" V. Tisdall to "Medea;" R. Gresley to "Medusa;" F. Finnis to "Sappho;" W. Moore to "Terpsichore;" D. Riddel to "Thetis;" R. Humpage to "Tribune;" Hon. R. Bingham to "Indefatigable;" W. Forsyth to "Intrepid;" T. MacGill to "Iphigenia;" H. Lang to "Latona;" G. Russell to "Naiad;" H. Royle to "Astraea;" A. Prothero to "Pearl;" M. O'Callaghan to "Pique;" W. Browne to "Rainbow;" and J. Ferris to "Sybille;" Commanders—G. Knowling to "Alarm;" H. Elwyn to "Basilisk;" A. Grenfell to "Circe;" A. Welldon to "Gossamer;" A. Meldrum to "Hebe;" J. Caulfield to "Dryad;" Hon. G. Digby to "Renard;" D. Hamond-Graeme to "Salamander;" Scott Grey to "Antelope;" and F. Stopford to "Curlew." Rear-Admiral Drummond has his flag hoisted in the "War-spite."

The Manœuvre Fleet this year is composed of the following vessels:—

1st class battle-ships (6).—"Royal Sovereign," "Empress of India," "Resolution," "Repulse," "Barfleur," "Benbow."

2nd class battle-ships (5).—"Alexandra," "Inflexible," "Colossus," "Edinburgh," "Devastation."

3rd class battle-ship (1).—"Conqueror."

Total, 12.

Of these ships, two, the "Alexandra," in her main battery, and "Inflexible," in her turrets, have only obsolete muzzle-loading guns mounted.

Belted cruisers (4).—"Waspire," "Aurora," "Galatea," "Australia."

1st class cruisers (5).—"Blenheim," "Endymion," "Gibraltar," "Theseus," "St. George."

2nd class cruisers (20).—"Astraea," "Bonaventure," "Brilliant," "Sappho," "Scylla," "Terpsichore," "Thetis," "Rainbow," "Latona," "Andromache," "Melampus," "Tribune," "Intrepid," "Iphigenia," "Indefatigable," "Pique," "Sybille," "Naïad," "Apollo," "Mersey."

3rd class cruisers (4).—"Medea," "Medusa," "Pearl," "Barrosa."

1st class torpedo-gunboats (16).—"Speedy," "Circe," "Renard," "Seagull," "Speedwell," "Antelope," "Rattlesnake," "Spider," "Alarm," "Onyx," "Sheldrake," "Gossamer," "Leda," "Hebe," "Dryad," "Salamander."

Torpedo-destroyers (2).—"Havock," "Hornet."

Torpedo-boats, 24.

For special service with torpedo-boats:—

Coast-defence ship—"Rupert," and the following small vessels: "Curlew," "Traveller," "Magnet," "Bullfrog," "Basilisk," "Trent."

The following table shows the total strength of the evolutionary squadrons after the partial mobilization of the present and four previous summers:—

	1894.	1893.	1892.	1891.	1890.
Battle-ships, 1st Class.....	6	4	6	6	4
2nd "	5	3	3	4	3
3rd "	1	4	7	9	6
Coast defence.....	1	1	6	2	7
Cruisers, 1st Class.....	9	7	6	5	9
2nd "	20	22	14	6	8
3rd "	3	4	6	9	9
Sloops.....	1	—	—	—	1
Torpedo gunboats.....	12	13	12	10	5
Destroyers	2	—	—	—	—
Gunboats	3	2	1	1	1
Torpedo-boats	24	24	27	20	24
Miscellaneous	3	4	4	4	3
Total pennants	90	88	92	76	80

It should be added that, for purposes of comparison, the system of classification now in use has been adopted throughout, but that, in fact, this year's fleet, being composed almost exclusively of modern vessels, is much more powerful than any of its predecessors. The ships specially commissioned hoisted the pennant at 9 A.M. on the 18th July, and, with one or two exceptions, the whole were got away from their respective ports the following day, proceeding to the different rendezvous, where four different fleets were formed as under:—

Group (1).

Group (2).

Special Vice v

Rupert.

* Div
numbers.
VOL. 3

RED SIDE. Vice-Admiral R.C'B. Fitzroy, C.B.			BLUE SIDE. Rear-Admiral E. H. Seymour, C.B.		
The "A" Fleet. Vice-Admiral R. O'B. Fitzroy, C.B. 1st assembly, Port- land. 2nd assembly, Fal- mouth.	The "B" Fleet. Rear-Admiral A. T. Dale. 1st assembly, Bere- haven. 2nd assembly, Bere- haven.	The "C" Fleet. Rear-Admiral E. H. Seymour, C.B. 1st assembly, Tor- bay. 2nd assembly, Queenstown.	The "D" Fleet. Rear-Admiral E. C. Drummond. 1st assembly, Mil- ford Haven. 2nd assembly, The Shannon.		
Group (1). Royal Sovereign. Resolution. Devastation. Blenheim. Endymion. Bonaventure.	Empress of India. Repulse. Conqueror. Astraea. Gibraltar. Theseus.	Alexandra. Barfleur. Benbow. Inflexible. Colossus. Edinburgh. St. George.	Warspite. Aurora. Galatea. Australia.		
Group (2). Brilliant. Sappho. Scylla. Terpsichore. Thetis. Rainbow.	Latona. Andromache. Medea. Medusa. Pearl. Barrosa.	Mersey. Melampus. Tribune. Intrepid. Iphigenia. Indefatigable. Pique.	Sybille. Naiad. Apollo.		
Group (3). Speedy. Circe. Renard. Seagull. Speedwell. Antelope. Rattlesnake. Spider. Havock. Hornet.	Alarm. Onyx. Sheldrake. Gossamer.	Niger. Jason. Leda.	Hebe. Salamander. Dryad.		
Torpedo-boat flotilla, &c. 1st assembly, Portland. 2nd , , Belfast.			Torpedo-boat flotilla, &c. 1st assembly, Falmouth. 2nd , , the respective stations.		
Special ser- vice vessel.	Torpedo- boats.*	Station.	Special ser- vice vessels.	Torpedo- boats.*	Stations.
Rupert.	45, 52, 53d, 80d, 85, 87.	Belfast.	Curlew. Traveller. Magnet. Bullfrog. Basilisk. Trent.	50, 59, 60d 26, 27, 93d 66, 77, 79d 64, 65, 67d 81d, 83, 84 72d, 73, 74	Holyhead. Waterford. Kingstown. Milford Haven. Queenstown. Piel (near Barrow-in- Furness).

* Divisional torpedo-boats are distinguished by the letter "d" placed after their numbers.

No general scheme of operations was this year promulgated by the Admiralty, the two fleets being simply pitted against each other. The issue of the operations will probably have been decided before these Notes appear in print, but for the purposes of future reference, we append a chart of the manoeuvre field with explanatory notes, which latter we have taken from an interesting article in the "Times" of the 18th July, omitting, however, the foreshadowing of the different strategical movements open to the opposing Commanders, into which the writer enters.

"Red and Blue are two opposing naval forces; the composition of each is known to both sides." This is all the information vouchsafed by the Admiralty concerning the general strategical situation; the rest must be evolved from a consideration of the conditions established. "It stands to reason, of course, that, Red and Blue being two opposing naval forces, each will endeavour to get the advantage of the other—either decisively to defeat it or otherwise to reduce it to strategic impotence. The conditions under which this enterprise is to be undertaken are somewhat complicated. Broadly speaking the Red side will operate from isolated and distant bases, the Blue side mainly with the support of its own territory on its flanks. The strategical area involved consists mainly of the waters adjacent to the coasts of Ireland, Ireland itself being converted into a peninsula by means of the artifice, first employed last year, of establishing a 'forbidden belt,' extending on this occasion in a south-westerly direction from the south-western corner of Ireland to the extreme limits of the manoeuvre area. The 'forbidden belt' is marked in the chart. The effect of the belt is to make it impossible for any of the contending forces to pass Cape Clear in either direction. The remainder of the manoeuvre area is defined as follows:—On the north it is bounded by the 57th parallel of N. latitude, running about 100 miles to the north of Ireland; on the west it is bounded by the 18th parallel of W. longitude, running about 300 miles to the west of Ireland; on the south it extends to 47° 20' N. latitude, or to about 180 miles to the south of Ireland; on the east it is bounded by the western coasts of Great Britain so far as they are included between latitude 57° N. and latitude 47° 20' N., extending within the Channel as far as the 4th parallel of W. longitude, but approaching nowhere within 10 miles of the coast of France. All the waters included within these limits are accessible to ships of either side, with the exception of the 'forbidden belt' already mentioned, which is about 30 miles wide, its western and eastern extremities being defined on the south coast of Ireland by Browhead and Galley Head respectively.

"We next have to define the respective territories of the two opposing forces. Those of the Red side are, as has already been said, very limited in extent. They are marked on the chart by a red tinted coast line. In the neighbourhood of Falmouth, the strategic base of the 'A' Red Fleet, the Red territory extends from the Lizard on the west to Stoke Point on the east, at the extreme eastern limit of the manoeuvre area, thus including Falmouth, in which ships are accessible only to torpedo-boat attack, and Plymouth, which, although nominally a Red port, affords no protection of any kind to Red ships taking shelter therein. In the neighbourhood of Berehaven, which is the strategic base of the 'B' Red Fleet, and enjoys, as such, the same immunities as Falmouth, the Red territory extends from the outer limit of the 'forbidden belt' at Browhead to Reenada Point, near Valentia. The only other point of territory assigned to the Red side consists of the shores of Belfast Lough, every portion of which affords the Red ships protection against attack by ships, while in the inner portion such ships of comparatively light draught as can anchor there will also be protected against torpedo-boat attack. The six torpedo-boats attached to the Red side will be stationed at Belfast and supported by the 'Rupert' as 'nurse.'

"So much for the Red side and its territory. We now come to the Blue side. The strategic base of the 'C' Blue Fleet is Queenstown, that of its auxiliary squadron the 'D' Blue Fleet is the Shannon. In both these ports the two Blue Fleets are secure against attack of any kind. The Blue territory on the west coast of Ireland extends from Bunbane, on the northern shore of Dingle Bay,¹⁰ Broadhaven Bay, in the northern promontory of county Mayo, and includes all the adjacent islands. On the south and east coasts of Ireland it extends from Galley Head, at the inner limit of the 'forbidden belt,' to Clogher Head in

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A CHART OF
THE

BRITISH ISLANDS

SHewing THE AREA OF
THE MANOEUVRE-FIELD
AND THE
TERRITORY ASSIGNED TO EACH SIDE
1894.

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Plate 4H.





county Louth, about 15 miles south of Carlingford Lough. In this territory there will be three torpedo-boat stations, Queenstown, Waterford, and Kingstown, at each of which a division of three torpedo-boats supported by a 'nurse' will be stationed. On the west coast of England the Blue territory will extend from Rhossili Point, in the county of Glamorgan, on the northern shore of the Bristol Channel, to St. Bees Head, in Cumberland. In this territory, again, there will be three torpedo-boat stations, Milford Haven, Holyhead, and Piel, near Barrow-in-Furness, each provided with a division of three boats and a 'nurse.' The Blue territory is indicated on the chart by a blue tinted coast outline. In each of the six Blue torpedo-boat stations the torpedo-boats will be secure against attack, but they will enjoy no such immunity in any other ports of the Blue territory. Blue ships other than those of Group 3, to which no specific tactical value is assigned, will not, unless already out of action, be allowed to enter Milford Haven without incurring a penalty. In other words, Milford Haven is closed, for strategical purposes proper, to all but torpedo-boats and torpedo-boat catchers, and the Blue side has no protected harbour on the eastern side of St. George's Channel. At the outset of the strategic manoeuvres proper the several fleets, instead of starting, as heretofore, from ports exactly known to the opposite side, will be ordered to proceed to certain points unknown to their respective adversaries, so as to reproduce, as far as may be, an initial situation almost certain to exist in actual warfare, and to counteract the tendency, often exhibited in former manoeuvres, to regard the whole contest as a mere race for position. Lastly, it should be mentioned that the Scilly Isles, the Isle of Man, the Scotch islands, and the remaining coasts of the United Kingdom, included within the manoeuvre area, but not specified as being Red or Blue territory, are declared to be 'neutral,' and are to be regarded, we presume, by both combatants, as neutral territory would be regarded by belligerents in war, the neutral waters adjacent to them extending for one mile beyond the five-fathom line. This means, of course, that no torpedo-boats can hide and no ships of any kind can take shelter along the coasts or among the islands specified as 'neutral.'

We ought to add that the relative value of the fleets and flotillas engaged has been determined by a scale of tactical values assigned to the several ships in Groups 1 and 2, the numerical details of which have not been disclosed by the Admiralty. The following officers have been appointed as umpires: Vice-Admiral Sir W. Hunt Grubbe, K.C.B.; Vice-Admiral Erskine; and Rear-Admiral H. Andoe, C.B.

500 Naval Reserve men have been called out, and distributed among the ships of the fleet, and we understand a much larger number were willing to volunteer had their services been required.

The new torpedo-boat destroyer "Daring," whose remarkable preliminary trial we recorded in last month's issue of the Journal, has now completed her official trials, and has maintained her place as the fastest vessel at present afloat. We are again indebted to the "Times" for the following full details of the trial:—

"On the 26th June the results were recorded of a series of progressive speed trials made with the new torpedo-boat destroyer 'Daring,' built for the British Navy by Messrs. John I. Thornycroft and Co., of Chiswick, giving that vessel the premier place for speed among those of her type which have up to the present been completed. Those trials, although attended by Admiralty representatives, were but preliminary to the final testing of the vessel, which it was decided should take place on Thursday, the 19th ult. At the time of the trials just noticed the vessel was comparatively light, being some tons within her full load displacement, and therefore capable, under the same conditions of wind and sea, of making better headway through the water. On the morning of the 19th ult., when leaving Greenhithe on her official trial, her draught was 5 ft. 7½ in. forward and 6 ft. 11½ in. aft, equivalent to a displacement of about 240 tons. In this trim she proceeded down the river, and, on her reaching the trial ground off the Maplins, six consecutive runs were made on the measured mile, with the result that her previous speed record of June 26 was beaten, she having attained a *maximum* speed, on one of the runs made, of 29.364 knots, or 33½ statute miles per hour. The runs were made with and against the tide, the *maximum* speed, as will be seen by the following tabulated statement, being made on the second run with the tide:—

Runs.	Tide.	Time.	Speed in knots.	Mean of runs.	
1	with	m. s. 2 4·0	29·032	28·111	{ Mean of speeds with tide = 29·065.
2	against	2 12·4	27·191		{ Mean of speeds against tide = 27·399.
3	with	2 2·6	29·364	28·277	
4	against	2 11·8	27·315		
5	with	2 5·0	28·8	28·194	Mean of means, 28·232 knots.
6	against	2 10·0	27·692		

"On an examination of this statement, it will be seen that the mean speed on each pair of runs, with and against the tide, which is the only correct way of summarizing them, was remarkably even, the results giving a true mean speed on the six consecutive runs of 28·232 knots, or 1·232 knots in excess of that contracted for. This noticeable equality in the resultant speed attained by the ship is accounted for by the great regularity in the revolutions of the propelling engines, and in the steam pressure in the boilers, which, for the six runs made on the mile, is shown in the following statement, giving a mean of 388·2 and 388·4 revolutions per minute in starboard and port engines respectively, and a mean pressure of steam at engines of 198 lbs. per sq. in. :—

Runs.	Revolutions.		Steam pressure.	Runs.	Revolutions.		Steam pressure.
	Starboard.	Port.			Starboard.	Port.	
			lb. per sq. in.				lb. per sq. in.
1	379·8	380·8	190	4	389·2	389·2	200
2	395·1	392·9	200	5	386·9	386·4	198
3	390·0	399·5	200	6	391·0	389·0	200

"The engines throughout the whole of the trial—which covered some considerable time of continuous running after the measured mile trials were completed—although driven at a high speed, worked with the greatest smoothness and regularity, and without the least sign of heating in any of the bearings; and the boilers—three in number—which are of an improved type of those fitted in Her Majesty's ship 'Speedy' by the same makers, worked admirably, the absence of any flaming at the funnels or noise from the safety valves being specially noticeable, the stoking of the boilers having evidently been so well managed that the steam pressure was maintained just at the working pressure required. For the size of the boilers, which have an aggregate heating surface of 7,890 sq. ft., with a grate area of 183, their steam generating powers are remarkable, a total of 4,735 indicated horse-power having been given off by the engines on one of the mile runs, the pressure of the steam at the time being 208 lbs. per sq. in., maintained with 3·15 in. of air pressure in the stokeholds. Worked out to its conclusions, this means that an indicated horse-power was developed in them by 1·66 sq. ft. of heating surface, and 0·04 of a sq. ft. of grate area. On the completion of the machinery trials, the turning and manœuvring capabilities of the vessel were successfully tested, after which she returned to the river and proceeded up to Chiswick, where she will be finally completed by her builders."

The "Ferret," the third of the new destroyers to be completed, successfully underwent her trials on the Clyde on the 10 ult. She has been built by Messrs. Laird, of Birkenhead, being the first of this class of vessel ordered subsequent to the "Hornet," and is of somewhat larger dimensions, having a length of 194 ft. between perpendiculars, with a beam of 19 ft. 3 in., and a displacement of about 220 tons; her armament is however the same, one 12-pr., and three 6-pr. Q.F. guns, with three torpedo-tubes. The engines are of Messrs. Laird's fast-running tri-compound type, the cylinders being 19 in., 29 in., and 43 in. in diameter, by 18 in. stroke; and all parts of the engines are accessible when working at full speed, as the builders have arranged a good passage at the back of the machinery, which will be found of great advantage compared to the ordinary torpedo-boat type of engine-room. The two circular condensers are placed forward of the main engines instead of in the wings, which involves an increase in length of engine-room, but gives a wider platform between the engines and a good passage all round, as indicated. Six runs on the measured mile gave a mean speed of 27·51 knots, and the maximum speed attained was 28·4 knots; on a continuous three hours' trial a mean speed of 27·51 knots was also maintained. The "Ferret" is fitted with the "Normand" water-tube boilers, which have given such good results in the French torpedo-boats, and no difficulty was experienced throughout the trials in maintaining the steam at the intended pressure.

The two new 2nd class cruisers "Charybdis" and "Flora" have successfully completed their trials; the first named made an eight hours' full power trial under natural draught on the 30th June with the following results:—Draught of water forward, 17 ft. 6 in., aft, 20 ft. 5 in.; steam in boilers, 141·7 lbs.; air pressure, 0·57 in.; vacuum, 27·2 in.; revolutions, 127·7; mean pressure—starboard, high 50·1, intermediate 25·9, low 11·5; port, high 50·7, intermediate 24·9, low 11·9. Indicated horse power—starboard 3,507, port 3,602·3; total 7,109·3. The horse power indicated was thus 109·3 above the specification, but the speed was even more satisfactory, the ship averaging 19·3 knots per hour, while the official estimate of her speed was only 18·25 knots. The four hours' full power forced draught trial took place on the 5th ult.; the results were eminently satisfactory, 9,163·4 I.H.P. being averaged, with a speed of 20·5 knots an hour. The contract was for 9,000 I.H.P., with a speed of 19·5 knots.

The official trials of the "Flora" took place in the Irish Channel; the ship left Pembroke, where she has been built, for her eight hours' natural draught on the 7th July; the engines worked most satisfactorily, and a speed of 19·3 knots was averaged. The ship went out again on the 10th ult. for the four hours' forced draught trial, when a mean speed of 20·43 knots was maintained.

No. "97" torpedo-boat, built by Laird Brothers, of Birkenhead, whose previous trials had not proved satisfactory, successfully completed them on the 10th ult. in the Clyde. Six runs were made on the measured mile as follows:—Steam, 170 lbs.; revolutions, 363; speed, 23·71; and I.H.P., 1,690. An average speed of 23·3 knots was maintained for three hours. Although the speed attained was over the contract (23 knots), the results of the trial are not as good as were attained by No. "92," built by Thornycroft, which reached and maintained for three hours a speed of 24·1 knots.

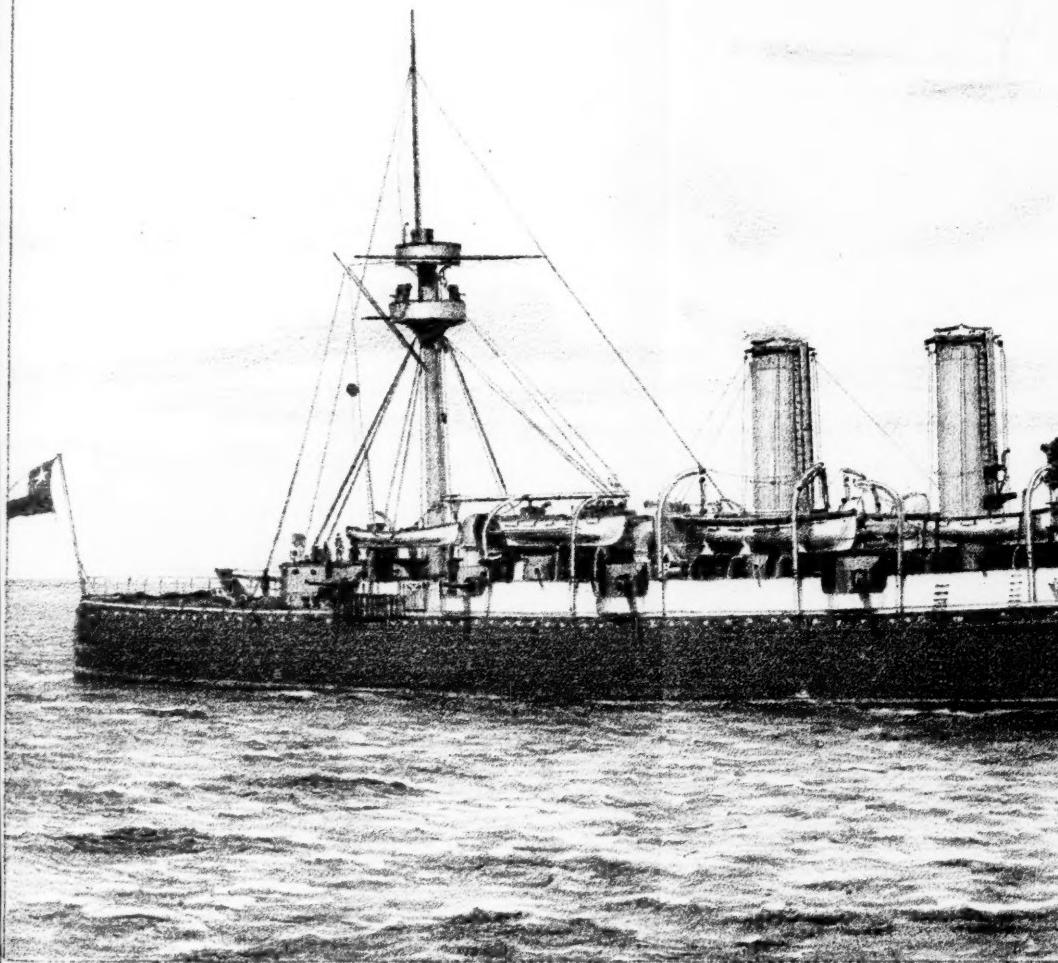
The 1st class cruiser "Crescent" arrived at Portsmouth on the 10th ult. from Australia with the paid-off crews of several ships on that station. She has maintained the reputation of herself and sisters as powerful and efficient cruisers, having averaged a speed of 13 knots the whole way out and home on a daily expenditure of something over 60 tons of coal; the longest run made on any one day was 369 knots. The 2nd class battle-ship "Dreadnought," from the Mediterranean, and the 3rd class cruiser "Pallas," from China, have both arrived at Portsmouth; they will be paid off after the Manoeuvres.

On the 5th July the new 1st class torpedo-gunboat "Hussar" was launched at Devonport. Her dimensions are:—Length, 250 feet; breadth, 30 ft. 6 in.; mean load draught, 9 ft.; weight of hull, 555 tons; displacement, 1,070 tons; coal capacity, 100 tons. The boilers and machinery have been built and placed on board by Messrs. Hawthorn, Leslie, and Co., Newcastle-on-Tyne. The propelling machinery consists of two sets of triple expansion surface condensing engines of the vertical inverted type. The engines are capable of developing a collective horse power of 3,500 on a three hours' forced draught trial, and 2,500 h.p. on an eight hours' natural draught trial. The principal dimensions of the main engines are:—Cylinders, high pressure, 22; intermediate pressure, 34; low pressure, 51 in. diameter, with a stroke of 21 in. The propellers are of the three-bladed type, and will make 250 revolutions per minute, which will give an estimated speed of 19 knots with the 3,500 h.p. and 17 to 17·5 knots with the full natural draught power. The boilers, four in number, are of the wet-bottomed locomotive type, each with two furnaces, and are to work at a pressure of 150 lbs. per square inch. The auxiliary machinery consists of four feed engines (two main and two auxiliary), two fire and bilge engines, two sets of air-compressing machinery by Bellis and Co., electric light engine and Siemens' dynamo, two drain tanks and two circulating engines, capstan, and steering engines, and two sets of Weir's evaporators and Kirkaldy's distillers combined for feed water and drinking purposes. The funnels and boilers and the whole of the auxiliary machinery are already on board. Her armament consists of two 47-in. and four 6-pr. Q.F. guns, one bow torpedo-tube, and two double revolving broadside torpedo-tubes. The total estimated cost of the vessel is £8,088*l.*, of which £1,610*l.* is due to increased rates of pay to workmen. She is to be completed and in the Fleet Reserve as ready for sea during the present financial year.

Chili.—Want of space has prevented us from noticing sooner the successful trials of the new cruiser "Blanco Encalada," (Plate 42), which took place off the Tyne, on the 22nd and 23rd May, the forced draught trials being carried out a week later. This fine vessel has been constructed by the firm of Sir W. Armstrong and Co., at Elswick, from designs by their naval architect, Mr. P. Watts, and adds another to the long list of cruisers, which, although only of, comparatively speaking, moderate tonnage, have, by their powerful armament and the high rate of speed attained by them, a speed hitherto unapproached by any vessels of a similar size built either for the English or any other navy, now for so many years commanded the admiration of the naval world. Her principal dimensions are:—Length, 370 ft.; breadth, 46 ft. 6 in.; and with a mean draught of 18 ft. 6 in., her displacement is 4,500 tons. She is built entirely of steel, and is sheathed with wood and coppered. For protection, in addition to the coal bunkers, which are disposed so as to reinforce her defensive powers as much as possible, she has a curved steel protective deck running throughout her whole length, varying in thickness from 4 in. on its sloping sides to 1½ in. on the horizontal parts, and entirely covering the machinery, magazines, and steering gear. Her engines, by Messrs. Humphrys, Tennant, and Co., of Deptford, are of the usual twin-screw triple-expansion type. Her armament, which is an extremely powerful one, consists of two 8-in. guns, one mounted forward and the other aft, as bow and stern chasers, protected by heavy steel shields, the front of which are 6 in. thick, made up of two 3-in. steel plates, the outer one being considerably curved, the inner plate, which is flat, forming the chord of the arc of the outer, while the sides and hood are 1·5 in. thick; ten 6-in. Q.F. guns, mounted in sponsons with 2-in. shields, the two foremost and the two aftermost of which can fire in line of keel. The vessel can, therefore, direct one 8-in. gun and two 6-in. ahead or astern, and two 8-in. and five 6-in. on any point within 50° either side of the beam. In addition to this armament of heavy guns, she carries 22 smaller Q.F. Hotchkiss guns, two Gatlings, and five torpedo-tubes. Her armament, therefore, is a much more formidable one than that of the "Astrea" type of cruiser, which are only some 250 tons smaller. It should be further remarked that the guns composing her main armament are of a peculiarly powerful type. The 8-in. guns are of 40 calibres length and have a velocity of 2,260 foot-seconds, with a 210-lb. projectile, and a very moderate

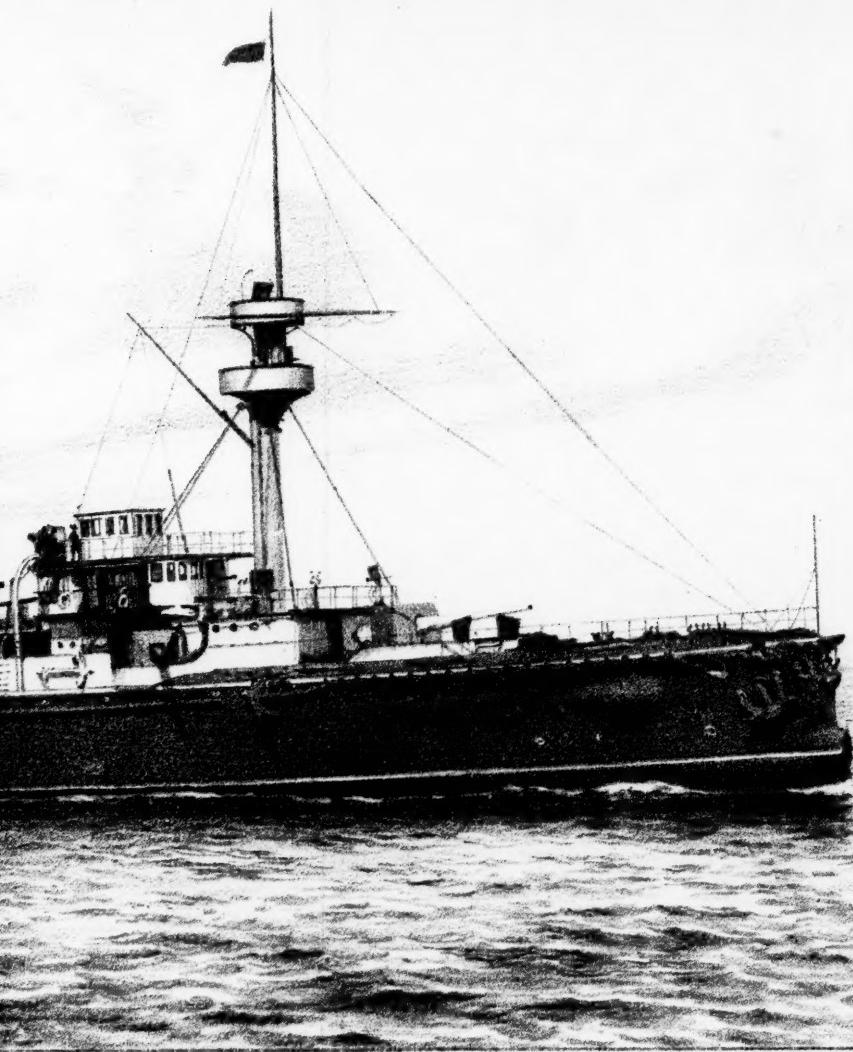
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THE NEW CHILIAN CRUISER "BLANCO ENCALADA".

Reproduced from an instantaneous photograph, presented



"LADA," 4,500 TONS, 14,500 I.H.P.

presented by Sir W. Armstrong and Co.

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chamber pressure. So improved are all the breech mechanism and powder supply arrangements, that the guns may be called quick-firers. This nomenclature was certainly borne out during the trials, when, with a crew that had never fired a round from the gun on any former occasion, four rounds were fired (the powder being supplied from the magazines) in 62 seconds; in fact the man who has to aim the gun need never be kept waiting for the loading. The 6-in. Q.F. guns are mounted on pedestal mountings; they are also of 40 calibres length, and have a velocity of 2,500 foot-seconds, with a 100-lb. projectile. During the trials 20 rounds were fired from the 6-in. guns and 8 rounds from the 8-in. In order to thoroughly try the structure of the ship, the after 8-in. gun was fired in line of keel horizontally, and the foremost 8-in. gun was fired ahead with elevation varying from the horizontal to 4° for five rounds, four of which were against time. This severe ordeal did not even crack the paint in the decks below the muzzles of the guns.

A torpedo was also fired from each of the two port broadside tubes. These tubes are of the new Elswick design, and are arranged for the use of cordite impulse, which has given such satisfactory results. A number of experiments has shown that the velocity of impulse of the torpedo is exceedingly regular, and that with a pressure of about 35 lbs. in the tube a velocity of 53 foot-seconds is obtained. The broadside tubes are capable of training through a large arc. So many were the novelties and improvements in the armament of this fine vessel, that both the Gunnery and Constructive Departments of the Admiralty were represented. During the 12-hours' natural draught trial a spread of 21·75 knots, with an I.H.P. of 11,000, was maintained. During the four hours' forced draught trial, the mean speed maintained was 22·78 knots, or a quarter of a knot in excess of that guaranteed by the contractors, the engines developing 14,500 I.H.P. We are indebted to the Elswick firm for the accompanying plate, they having presented us for reproduction in the Notes of this Journal with an instantaneous photograph of the ship taken under steam off the Tyne.

Denmark.—The training squadron has been constituted under the command of Vice-Admiral Meldal as follows:—Battle-ship, "Helgoland"; armoured torpedo-ship, "Tordenskjold"; 3rd class cruiser, "Hekla"; and a 1st class torpedo division boat. The "Helgoland" is a small battle-ship of 5,370 tons, with an all-round 12-in. armour belt; amidship the armour is carried up over a central battery, the plates being 10 in. thick, with 7-in. armoured transverse bulkheads; the central portion of the foremost bulkhead is carried forward to protect the base of a 10-in. armoured turret which rises above the upper deck, and in which is carried a 30·5-cm. (12-in.) gun; in the central battery are mounted four 26-cm. (10·2-in.) guns, the two foremost having a training from right ahead to 10° abeam, and the two after from right astern to 10° before the beam; on the upper deck are also carried five 12-cm. (4·2-in.) and ten machine-guns; there are also four torpedo-tubes.

The "Tordenskjold" is a vessel of 3,290 tons, with a 4-in. protective deck and a barbette plated with 9-in. armour rising from it forward, in which a 35·5-cm. (13·9-in.) gun is mounted; she also carries four 12-cm. (4·2-in.) guns, eight machine-guns, and has four torpedo-tubes. The "Hekla" is a small cruiser of 1,200 tons and 3,000 I.H.P., with a speed of 17 knots, which was launched in 1890; her armament consists of two 15-cm. (5·9-in.) guns, four 6-pr. Q.F. guns, six machine-guns, and four torpedo-tubes. The squadron is to be at Carlskrona during the festivities in connection with the silver wedding of the Crown Prince and Princess of Sweden. ("Die Reichswehr.")

In the course of the coming autumn, the construction and armament of the large sea fort of Middelgrund, which will complete the sea defences of Copenhagen, will be finished. In conjunction with the old sea forts situated nearer the town, and with the fort of Charlottenlund, constructed on the shore to the north of the capital, it will now be easy to repel any attack of a hostile squadron, as, moreover, the channels are defended by several lines of submarine mines.

The fort of Middelgrund was commenced in 1890, and the work at first was

carried on under difficulties, as the foundation had to be laid in the sea at a depth of 22 ft. in a sandy bottom, and with a strong tide running. The fort covers a surface of 14 acres, with an extreme elevation of 70 ft.; it has cost 12,500,000 fr., 5,000,000 of which are for the armament. The old sea forts were incapable of preventing a bombardment of the capital by battle-ships armed with modern guns, and it was indispensable to place the sea forts on the same level of efficiency as those on the land face. The new works for the protection of the capital were commenced in 1886 by the construction of the detached fort "Garderhøj," under the following circumstances, which are worth recording:—The Chamber of Deputies refused for many years to place at the disposition of the Minister of War the funds necessary for putting the capital in a proper state of defence, and for preventing the harbour and arsenal being carried by a *coup de main*. It was then that some patriots laid the state of affairs before the Danish people, and called upon them to subscribe voluntarily the sums necessary for carrying out the work. Large subscriptions poured in, and with the authorization of the King the construction of Fort "Garderhøj" was begun.

Supported by this patriotic movement, General Bahnsen, who has been Minister of War since 1884, has had the energy, in spite of the passive resistance of the Chamber of Deputies, to complete the fortifications of Copenhagen, obtaining the necessary funds from the Treasury by virtue of Article 25 of the Constitution, which empowers the King, in cases of urgency, to pass laws provisionally, that is to say, laws which have not been submitted for the approval of the two Chambers. It is only this year that the Chamber of Deputies has recognized *le fait accompli*, and has authorized the expenses required for the maintenance of the new works.

The line of fortifications extends from the sea (Gresund) on the north, up to the strait which separates the large island of Sjælland, on which the capital is situated, from the small island of "Amager." The length of this line is 30 kiloms. (16 miles). By means of moats, detached forts, and an enceinte, all constructed and armed on the most modern principles, the capital has been made a strong place, not it is true a fortress of the first rank, but sufficiently so to serve as a point of retreat of the army, and to protect the military establishments, arsenal, and harbour.

(*"L'Avenir Militaire."*)

France.—The following are the principal appointments which have been made: Capitaines de Vaisseau—Billard to "Redoutable," Nicolas to "Roland," Richard for service in Ministry of Marine, Rivet to "Ilsy," Caillard to "Iphigénie," Vranken to "Turenne," Ingouf to "Latouche-Tréville," Pouvreau to "Charner," Magnon-Pujo to "Jemmapes," and Bugard to "Chazan;" Capitaines de Frégate—Hubert to "Mytho," De Faubourget de Montferrand to "Vauban," tender to the School of Gunnery, Duroch to "D'Iberville," Le Clerc to "Mitraille," Schlumberger to "Achéron," Lieutard to "Fusée," Richard d'Abnour to "Flamme," Dufayot de la Maissonneuve to "Cocyté," Le Moine des Mares to "Phlégétон," and Germinet, personal aide-de-camp to the President of the Republic.

(*"Le Moniteur de la Flotte."*)

The new battle-ship which was laid down at the arsenal of Le Mourillon, Toulon, in July, 1891, as the "Lazare Carnot," but which henceforth, in memory of the assassinated President as well as of his grandfather, is to be called "Le Carnot," was launched on the 5th July. She is practically a sister ship to the "Charles Martel," which was launched at Brest on August 28, 1893. The length of the vessel is 396 ft., her beam 71 ft., her draft aft 27½ ft., and her displacement 11,882 tons. She has a complete steel belt with a maximum thickness of 17½ in., and a curved steel deck 2½ in. thick. Above the water-line belt there rises for an additional height of 4 ft. a steel belt of 4-in. armour. The machinery of the ship consists of a pair of compound vertical engines with three cylinders, fed by 24 Lagrafelle and d'Allest boilers. At 95 revolutions, with forced draught, 13,500 horse-power should be developed, giving a speed of 18 knots, and with 85 revolutions, with natural draught, 9,500 horse-power, giving a speed of about 17 knots. The machinery weighs 1,178 tons. The normal coal capacity is 800 tons, or

enough for 4,000 knots' steaming, but when all subsidiary bunkers are full, coal for 6,000 knots can be carried.

The cost of "Le Carnot" will be—for the ship 960,000*l.*, for her gun and torpedo armament 104,000*l.*, and for machinery and boilers 127,200*l.*, or, in all, 1,191,200*l.* The armament will consist of two 11·8-in. guns, one in a 14·6-in. turret forward, and the other in a similar turret aft, the forward gun being 26 ft., and the after gun 19 ft. 6 in. above the water-line; two 10·6-in. guns, one in a 14·6-in. turret on each beam, eight 5·5-in. quick-firing guns, mounted singly in 3·9-in. turrets, four on each beam, four 2·5-in. quick-firing, twelve 1·8-in. quick-firing, and eight 1·45-in. quick-firing or Maxim automatic guns. There will also be four above-water and two submerged torpedo-launching tubes. The most significant feature of the vessel is the enormous power of her right-ahead and right-aft stern fire. In each case this is furnished by one 11·8-in., two 10·6-in., and four 5·5-in., besides smaller guns. Beam fire is furnished by two 11·8-in., one 10·6-in., and four 5·5-in. guns, so that in every direction the ship is offensively strong to an exceptional degree.

The Naval Manœuvres began on the 15th July, and were continued in two series until the 3rd of this month. In consequence of the absence of one division of the active Mediterranean fleet consisting of the battle-ships "Hoche" and "Neptune," and the 1st and 3rd class cruisers "Tage" and "Lalande," on the coast of Algiers, the manœuvres in the Mediterranean have this year not been on the same scale as they have been the last three years; they have consisted mainly of different trials of scouting, but from the 30th July to the 3rd of this month the two fleets acted independently of each other, the Active Squadron off Corsica, and the Reserve Squadron off the Coast of Provence, in conjunction with the vessels and torpedo-boats of the "Défenses Mobiles." The Commanders-in-Chief of the two squadrons, Vice-Admiral Boissoudy of the Active, and Vice-Admiral de la Jaille of the Reserve, assumed the duties of Umpires-in-Chief. In the Channel a regular theme of manœuvres was carried out as usual; the Northern Fleet, under the command of Vice-Admiral Brown de Colstoun, representing an enemy's force, had to attack various points on the coast between Havre and Dunkirk. The object has been to test the new organization for coast-defence, which came into force by the decree of the 4th February last, and to try and ascertain how the system would work in the event of a real maritime war. The two sections, into which the coast liable to be attacked is divided, were left to their own resources, being denuded of all naval protection except that afforded by the armoured gunboats and other vessels of the "Défenses Mobiles." The Dunkirk section was under the command of the General commanding at Dunkirk, who was assisted by Capitaine de Frégate Noirot, while the Havre section was under the command of Rear-Admiral Sallandrouze de Lamornnaix, assisted by a Colonel on the staff; both of these officers were under the supreme command of the Maritime Prefect of Cherbourg, Vice-Admiral Cavelier de Cuverville, himself acting under the Minister of War. One result of the manœuvres will be to compare the working of the system of coast-defence, as carried out under a naval and military officer respectively. The land forces quartered in the two sections took part in the defence of the coast, the various coasts and batteries being manned by garrison artillery from Dunkirk, Calais, and Havre; in the Dunkirk section a battalion of the 110th infantry regiment formed a mobile force as required along the coast, two battalions of the same regiment strengthened by three companies of the 8th being stationed for the defence of fixed points; in the Havre section, two battalions of the 129th regiment of infantry formed a mobile force alone. At the conclusion of the first period of the manœuvres, one division of the fleet was sent to force a passage through the Straits of Calais and attack the coast, the duty of the other division being to frustrate it. ("Le Moniteur de la Flotte and Le Temps.")

Germany.—The following are the principal promotions and appointments which have been made:—Corvette-Captains Gruner and Jaeschke to be captains; Captains Büchsel to "Friedrich der Grosse," Graf Friedrich von Baudissin for service at Ministry of Marine, Jaeschke for service at Ministry of Marine, Rittmeyer to

"Kurfürst Friedrich Wilhelm," Galster to "Worth," Piraly and Riedel placed on retired list; Corvette-Captain Jachmann for service on the staff of the Marine Artillery. ("Marine-Verordnungs-blatt.")

We regret to report the death of Captain Valette at Wilhelmshaven, on board the "Kurfürst Friedrich Wilhelm," which occurred on the 6th June from heart disease; the deceased officer was, not long ago, for some two years senior German naval officer at Zanzibar and on the East Coast of Africa, and must therefore be well known to many English officers.

At a grand parade at Kiel, on the 24th June, the young Prince Adalbert of Prussia was formally introduced to the navy by his father, the Kaiser; the Emperor during the ceremony made the following interesting speech to the assembled officers and men:—

"By Imperial Rescript I have to-day enrolled my son, Prince Adalbert of Prussia, in the German Navy. His name shows that he was destined from his birth to the hardy life of a sailor. His entrance to-day into the navy is a symbolical act with a threefold meaning. It teaches him that every Prussian Prince, as soon as he is ten years old, must understand that his whole energies have to be devoted to the service of the Fatherland; secondly, it is a proof of my own affection for the navy; and, lastly, it is a sign of the confidence I place in the navy. The history of the navy is yet young. It has not yet been granted the laurels of victory in battle, but whenever it has shown itself it has done credit to Germany. The month in which Prince Adalbert joins the naval service is full of great memories for the history of the Fatherland. Stirring names recall splendid traditions. I need only remind you of Hohenfriedberg and Waterloo, where Prussian and British soldiers fought shoulder to shoulder against the enemy. And who will not, in this month of June more especially, remember the Emperor Frederick, to whom it was also granted to wield the German sword with such glorious results? Your task is to keep your steel whetted, so that if ever—which God forbid—the time should come for me to call upon you, you should acquit yourselves, not only honourably, but gloriously."

At the march past, which concluded the ceremony, Prince Adalbert went past his father as one of the officers of the 1st company of the First Seamen's Division.

("Kreuz Zeitung.")

On the 17th June was celebrated, with great festivities, the 25th anniversary of the opening of the new harbour works and dockyard at Wilhelmshaven, which ceremony was performed with great pomp by the late Kaiser William, at that time King of Prussia, in presence of the Grand Dukes of Oldenburg and Mecklenburg, the then Commanding Admiral of the North German Fleet, Prince Adalbert of Prussia, Bismarck, von Moltke, von Roon, Minister of War and Marine, and other great dignitaries of Prussia and Oldenburg. The Minister von Roon pronounced the baptismal words as follows: "By virtue of the Royal Decree, I announce that from this hour the name of this harbour and town shall be Wilhelmshaven, and Wilhelmshaven it shall remain for all time."

("Kreuz Zeitung.")

According to a Return lately published by the Ministry of Marine, there are at present on the active strength of the navy:—2 Admirals, 3 Vice-Admirals, 9 Rear-Admirals, 38 captains, 73 corvette-captains, 148 captain-lieutenants, 201 lieutenants, 108 sub-lieutenants, and 271 cadets. In the marine infantry: 1 colonel, 3 majors, 9 captains, 9 first and 18 second lieutenants. The Engineer Staff consists of: 3 staff engineers, 11 chief engineers, 29 engineers, and 48 assistant engineers. Belonging to the Medical Corps are: 1 surgeon-general of the 1st class, with the rank of Rear-Admiral, 7 senior 1st class staff surgeons, 8 senior 2nd class staff surgeons, 37 staff surgeons, 29 1st class assistant surgeons, 17 2nd class assistant surgeons, and 10 assistant surgeons. Paymasters: 4 senior paymasters, 39 paymasters, and 26 assistant paymasters. Warrant officers, 777; petty officers, 3,206; seamen, 13,976; bandsmen, 156; artisans, 154; sick-berth attendants, 162; ship's stewards,

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including candidates, 147; armourers, 12; boys, 600. In commission at present are: battle-ships, two 1st class, two 2nd class, five 3rd class, four 4th class, and 1 armoured gunboat; cruisers, one 2nd class, three 3rd class, three 4th class; 4 gunboats, 4 avisos, 11 training ships, 2 surveying vessels, 1 torpedo-transport ship, 31 torpedo-boats, and 1 Royal yacht. ("Kreuz Zeitung.")

The manœuvre squadron, the details of which we gave in the June Notes, has lately been cruising in the North Sea, and has also been sounding off the eastern entrance of the new North Sea and Baltic Canal, to ascertain if it will be necessary to carry out dredging operations on a large scale, to make the approaches safe for large battle-ships at any state of the tide; in the first week in August the squadron is to operate against Heligoland, and on the 11th to proceed to Wilhelmshaven, where the fleet for the Grand Autumn Manœuvres will be assembled. Leaving Wilhelmshaven on the 19th, the fleet will, after cruising in the North Sea, proceed to Danzig and Zoppot to take part in the combined naval and military operations before the Kaiser, at the conclusion of which the ships will return to Kiel for final inspection and dispersion. ("Nord-Ostsee Zeitung.")

The following special appointments have been made for the Manœuvres:—Rear-Admirals—Thomsen to command the new 2nd squadron to be formed out of the four training ships, with his flag in the "Stein;" and Oldekop, to command the division formed out of the four coast-defence battle-ships with his flag in the "Hildebrand"; Corvette-captains—Breusing to command of "Wörth," which is to fly the flag of Baron von der Golz, the Commanding Admiral of the German Navy; Rosenthal to command the newly formed 2nd torpedo-boat flotilla; and Freiherr von Schimmelmann to command the division formed out of the torpedo-boats in commission for training purposes. ("Kieler Zeitung.")

The repairs to the new battle-ship "Brandenburg," on board of which the terrible explosion occurred last February, when on her trial trip, have now been completed, and the ship made a most successful 24 hours' trial under natural draught on the 23rd—24th ult., when she maintained an average speed of 16·5 knots an hour; according to present arrangements, the six hours' forced draught trial was to be made on the 31st ult.; her sister ship, the "Wörth," was commissioned for her trials on the 1st of this month." ("Kreuz Zeitung.")

Russia.—An Imperial Decree directs that the new coast-defence battle-ship building at the New Admiralty Works, St. Petersburg, is to be called the "Grand-Admiral Apraxine," and the 1st class battle-ship building in the Admiralty yard at Nicolaieff, the "Rostilaw;" the first-named will be attached to the Baltic Fleet and the latter to the Black Sea. Only one vessel, the 2nd class cruiser "Vestnik," at present in the Arctic Ocean, is to return to Cronstadt this year, but the two armoured cruisers, "Grand-Admiral" and "Vladimir Monomakh," are to proceed to the Atlantic and Mediterranean respectively, and the 2nd class cruiser "Djigit" to the Pacific and China. ("Messager de Cronstadt.")

The Government are pushing on as rapidly as possible the construction of the new docks at Sebastopol, and it is proposed to lay down two more battle-ships and three cruisers there during the ensuing six months; these vessels will be attached to the Black Sea Fleet; this fleet is to be reorganized, and the Governor of Sebastopol will have the sole charge of the coast-defences; hitherto this officer has been a military officer of rank, but, for the future, a naval officer will be appointed, with the title of Commander-in-Chief of the Black Sea Fleet. ("St. Petersburg Gazette.")

The following account of the latest armour-plate trials we have taken from the "Times":—

"A remarkable trial of English armour-plates took place on Thursday, 29th June,

in the artillery polygon at Okhta, near St. Petersburg, with results that were certainly startling. There were three plates—one from Messrs. Cammell, measuring 8 ft. square and 6 in. in thickness, and two from Messrs. John Brown and Company, one being of the same dimensions as those of the Cammell plate, and the other 8 ft. square, 10 in. thick, and bent. All three plates had been face-hardened by the Harvey process. The gun used throughout was a 6-in. Oboukhoff of 45 calibres. The projectiles were of two sorts—namely, the latest improved Holtzer shell, made at the Russian Putilof works, and a similar shell with a Russian improvement, the secret of which is jealously guarded. The velocities of six rounds fired at the 6 in. plates were all about 1,850 ft.-secs. At the 10-in. plates the velocity was nearly 2,400 ft.-secs. One round was fired with each projectile, which, on account of the curvature of the plate, struck with an obliquity of from 8° to 10°. All the shells treated by the secret Russian process penetrated the targets entirely, and sped some thousand yards to the rear, while the other shells, under similar conditions, though obtaining greater penetration than has ever yet been reached by any projectiles known in England, were stopped and broken up.

"The projectile used," continues the correspondent of the "Times," "is called the magnetic shell, a title which, if it is not intended to mislead, should give some clue to its composition. The Russians could hardly expect to employ this invention so conspicuously in the presence of a number of French and English scientific experts and to keep the secret all to themselves. In fact, the foreign representatives soon formed their own conclusions. The magnetic shell, they believe, is not a new shell at all, but simply a new invention adaptable to any modern projectile. The Russians, indeed, stated that the magnetic improvement was applied to the old as well as to the Putilof improved Holtzer shell. As one of the shells which had undergone the secret process, shown to us in an undamaged condition after having passed through one of the plates, exhibited no traces of fastening whereby the new invention could be attached to it, the spectators concluded that the said improvement must be a cap of softer metal held on to the top of the shell by the latter being in some way or other magnetized. This nurses the hard point of the shell at its impact, and so helps it to penetrate the surface of the plate until it reaches the softer metal behind. Such are the shrewd guesses of men who understand these matters. The invention is by some attributed to Admiral Makaroff, President of the Technical Committee, one of the ablest officers in the Admiralty. He does not, however, openly accept the credit for it.

"There is good reason to believe that the magnetic shell is similar to a shell fitted with a wrought-iron cap, mentioned in Captain Orde Brown's book on armour, which was tried in England by General Inglis and Captain English 15 years ago. But, from the description given by Captain Orde Brown, the mode of attachment at that time was evidently at fault, not the principle.

"As very great interest is being taken by English naval officers in these particular trials, I here give a summary of the total results as regards the tests of the armour plates completed. The Brown 6-in. plate received altogether four rounds of the magnetic shell—one at normal firing, one at 15°, one at 20°, and one at 25°. The first three passed through the plate and backing intact, but the one at 25° broke up after passing through. Cammell's 6-in. plate had one shell unbroken through both plate and backing at normal firing; one at an angle of 15° through plate and backing was completely broken up—one at 20° was pulverised, with penetration of only 3·3 in.; and two at 25° were both pulverised, with indentations of 3·4 in. Both plates are seriously cracked. This completes all the shots with magnetic shells at the two 6-in. plates.

"Besides the above shots, each of the 6-in. plates received two Putilof improved Holtzers, which in every case were broken up. At point-blank firing the projectile penetrated the plate, though not the backing, but at oblique firing did not penetrate. All the rounds were fired at a velocity of about 1,850 ft.-secs.

"The third plate, the 10-in. curved shield of John Brown and Co., was fired at with one old-pattern Holtzer at normal firing at a velocity of 2,180 ft.-secs. This was broken up in the plate, with penetration of about 9 in. The plate shows no sign of cracking, although this was the seventh shot fired into it."

The following remarks on the trials by the Sheffield Correspondent of the

"Times," are also of interest: "Further particulars have come to hand respecting the Russian shell tests which took place at St. Petersburg during the past week. The object of these trials was to test some new improvement in projectiles on which the Russian Government has been experimenting for some time. The nature of this improvement is kept very secret, but the Sheffield experts who were present at the trials are quite satisfied that they have solved the mystery as to the construction of the shell. In the first instance, two Sheffield 6-in. plates, being both placed normally to the gun, were attacked each by one projectile of Holtzer's most recently-improved manufacture and one of the same kind *plus* the Russian secret improvement. The behaviour of the two plates under these conditions was practically identical, so much so that the Russian authorities expressed the opinion that they might have been cut out of a single plate. In each case the improved Holtzer projectile was shattered to pieces, and though it got some of its fragments into the backing, did not get through the skin beyond, while the projectile having the Russian improvement completely perforated the metal target and went some distance beyond. From this stage forward the artillery authorities, being satisfied that the two plates were alike, discontinued the similarity of conditions in order to obtain the greatest experience possible. Brown's plate was first placed at an angle of 15° to the line of fire, and attacked by two projectiles exactly as before. The previous result was repeated—that is to say, the improved Holtzer projectile was stopped and broken, while the Russian improved shell passed through the target intact. Cammell's plate was then turned to an angle of 25° to the line of fire and similarly attacked. At this angle both the projectiles were shattered to pieces, without obtaining much penetration; nevertheless the one carrying the Russian improvement punished the plate more and obtained deeper penetration than the other. Brown's plate was then attacked with the Russian improved projectile at 20° of obliquity, and the projectile was still victorious. Even at 25° this plate which was then in a considerably shattered condition, just allowed the projectile to get through in small fragments. Cammell's plate, subsequently attacked at 20° and 15° with the Russian improved projectile, defeated the projectile at 20°, but was defeated by it at 15°. From this, it would appear that the Russian improvement is of great advantage to the projectile even at considerable angles of obliquity, and that at any rate the improvement does not, as was anticipated, do more harm than good when the attack is oblique. A 10-in. curved plate of Messrs. John Brown and Co. (Limited) was also experimented upon. The velocities used in the attack of this plate were very much higher than in the case of the 6-in., being up to 2,400 ft. per second instead of 1,850. At this high velocity the improved Holtzer projectiles were stopped and broken, while the same shot, with the Russian secret improvement penetrated the entire target. No fewer than seven shots under various conditions were fired at this plate, but at the end of that number of rounds it was absolutely without a crack.

"A few comments may be made upon these trials, more particularly as to the method in which the angles of obliquity were determined and the velocities of the projectiles estimated. The powder employed was the smokeless powder, and from information received from the agent of the firm who had made the guns for the Russian Government, this powder during a series of tests with the same charge had given chamber pressures varying from 2,500 up to 3,200 atmospheres. It is therefore very clear that with a powder of this nature it is somewhat unsafe to estimate the velocity from the weight of the charge. Notwithstanding this, only a few velocities were actually taken, the remainder, when the charge was the same, being assumed to be also unaltered. The obliquity of the plates was determined by a very rough expedient which might easily have induced an error of at least 5° in the position of the plate. It is unfortunate that these sources of possible error existed, as they render it difficult to rely absolutely upon the comparative results obtained. Nevertheless there can be no doubt that the Russian improvement will be heard a great deal more of in the near future. If the trial had been one of plate against plate, the most essential condition would be that every velocity should be taken, and every precaution employed to insure that the conditions were absolutely identical for the rival plates. But nothing of this kind was done, the whole object of the Russian Government being simply to ascertain

the penetrative powers under different conditions of their improved projectile as compared with other projectiles previously in use. It may be said that the Russian design of projectile, apart from the material of which it is composed, and any secret improvements, is decidedly superior to the design used in France and England.

"The result of the tests is not likely to cause any revolution in armour-plate manufacture. It will only necessitate the employment of slightly thicker armour than has hitherto been found necessary. The "Harveyed" plates in the tests did not show any marked superiority over the St. Chamond plate. A comparison of the effects of the new projectile upon the St. Chamond tough steel plate and the Brown Harveyed plate shows that the latter was penetrated $15\frac{1}{2}$ in., while the St. Chamond was penetrated about 13 in. When the Russian improvement was not employed the Brown plate was penetrated 6 in. or 8 in. only, and the St. Chamond still 13 in. It remains to be seen what will be the result when the St. Chamond plate is treated by the Harvey supercarburizing process, and a trial to determine this will shortly be made in Russia.

"With respect to the possibility of increasing the thickness of armour to meet improvements in projectiles, it may be mentioned that the new Harveyed armour is only two-thirds of the thickness of the armour previously employed to obtain the same resistance, so that there is a margin of one-third the thickness and weight of the armour before it is necessary to increase the thickness beyond what was the custom a year or two ago."

MILITARY.

For some years past, Mr. Maxim, as is well known to our readers, has been carrying out experiments with a view to constructing a machine able to propel itself through the air. His efforts have now been crowned with success. On Tuesday, 31st ult., he, together with two of his men, travelled through the air on his flying-machine for a distance of some 500 ft. This, of course, does not mean that the problem of aerial locomotion has been completely solved; on the contrary, very much has to be done before flying will be practicable for the human race. What Mr. Maxim has done is to show that it is possible to make a machine combining so much power with extreme lightness of construction as to be able to travel through the air, carrying its water, its fuel, and its engineers with it.

For his experiments, which have been conducted near Bexley, in Kent, Mr. Maxim has laid down a track of light railway, some 1,600 ft. long, on which the machine runs. On each side of this railway, and standing about 2 ft. above it, is an inverted track of strong timber. From each side of the machine there project two arms carrying flanged wheels, which press against the lower side of the timber track whenever the machine rises more than an inch or two from the rails, and so prevent it from soaring into the air. On Tuesday, as is plainly shown by the marks on the timber, the machine, almost directly after starting, rose from the metal rails and sailed along for some hundreds of feet, held down by the outside check-rail. It would doubtless have gone the whole length of the railway but for an unfortunate accident. Mr. Maxim, calculating that the main stress would fall on the forward pair of projecting arms, had made the pair behind somewhat too weak, so that they bent under the strain they had to bear. In this way the back part of the machine was liberated from the control of the check-rail, and naturally began to sway violently. The front wheel on the left-hand side in consequence jumped the rail, and the only remaining guide wheel ploughed into the timber, broke off one of the posts, smashed its flange, twisted its axle, and liberated the machine from the track altogether. It was then soaring at a considerable angle, when it was brought to a standstill, considerably damaged, on the turf, by Mr. Maxim's shutting off steam. Here there is certain evidence that it had really flown, and had not merely

run along the rails. The turf is not at all ploughed up, as it would inevitably have been had the machine slipped off the rails and run along the ground. On the contrary, the wheels have sunk cleanly into the earth, just as they would have done had the machine been dropped down perpendicularly, as in fact it was. These and several other facts are amply sufficient to prove that it really did rise from the rails, even without the testimony of the witnesses who were specially placed to observe what occurred.

The machine from which this striking result has been obtained is a marvel of engineering ingenuity. With its four ride-sails and "areoplanes" set, it is over 100 ft. wide, and it is described as looking like a huge wide bird, with four wings instead of two. It is propelled by two large two-bladed screws, resembling the screw-propellers of a ship, driven by two compound engines which are, in proportion to their weight, the most powerful that have ever been made. They can develop one horse-power for every 2 lbs. of their weight. The boiler is of novel design, and consists of very many tiny tubes, through which there is a forced circulation of water. It is so efficient that the pressure can be raised from 200 lbs. per square inch to 300 in about a minute, and is more than capable of supplying steam to the engines even when they are making 500 revolutions a minute. In Tuesday's successful trial Mr. Maxim started with a pressure of 310 lbs., which had risen to 320 when he had traversed some 500 yds. To realize the full meaning of this result, it must be remembered that these 500 yds. were run at the rate of 45 miles an hour, the propellers making some 500 revolutions a minute. The fuel used was gasoline. The total weight of the machine on the 31st ult. was about 3,000 lbs., while the engines were giving a lifting power of about 10,000. There was, therefore, a surplus flotatory power of some 2,000 lbs., or, in other words, the machine could have flown with something near that amount of extra weight above what it actually carried. It was, of course, this 2,000 lbs. of surplus lifting power that did all the mischief, by throwing on the controlling axles a strain they had not been designed to bear. After such an experiment few engineers will in future be found willing to deny, as some have in the past, the possibility of constructing an aerial vessel so powerful and yet so light as to be able to propel itself and its screw through the air, together with water and fuel sufficient for a voyage. ("The Times," 3rd August.)

China.—*The Chinese Army.* (Reprinted, by permission, from the "Times," 6th August.) War having now been formally declared between China and Japan, the new Chinese Army, on which Li Hung Chang and his countrymen have expended their money and their energy for nearly 30 years, is about to have the opportunity of showing its military value. That army has been critically examined during the last 15 years by highly competent English and Russian officers to the full extent of the opportunities afforded them; and we owe to the published, and still more to the unpublished, reports of Captain Gill, Colonel Mark Bell, Mr. James, now Chief Commissioner of Scinde, and Colonel Poutiata, a fairly complete and comprehensive description of the disciplined and modern-armed Chinese forces. But, if some of their conclusions are a little disparaging, it must be recollect that all these travellers saw only detached portions of the several bodies that make up the Chinese Army, and that it was their duty to be critical and to apply a very severe test in their examination. Moreover, the most recent of these observers wrote five years ago, and since that date military reform in China has not stood still. The practical proof which is about to be supplied will solve this interesting problem, and the question of the place to be accorded China as a military Power cannot be devoid of influence on the general progress of the Eastern World.

Vast as are the numbers of the fighting men of China on paper, they bear but a very small proportion to the huge population of that empire. The old Chinese Army, in its three divisions of Manchu, Mongol, and native Chinese, did not exceed the nominal strength of one million, and all the efforts of military reformers have been devoted to increasing the efficiency and not the size of that force. The Green Flag, or Luhying, corps still represents the bulk of the army, furnishing on paper a total of 650,000 men scattered throughout the 19 provinces, excluding the new

province of Manchuria, of which the empire is composed. It is controlled by the local Viceroys and Governors, who may in some instances have attempted to improve its efficiency, but as a general rule this force has little or no military value. It has not been subjected to any regular discipline, its arms are ancient and useless, and even its paper strength is never attained during the brief period that it is subjected to an annual course of training. If there was any truth in the recent report that the provinces were to call up 20,000 men apiece, it would mean that the Viceroys and Governors would be held responsible for that quota of the Green Flag army. But for a war with even such an opponent as the Japanese it is quite clear that the national army of the Green Flag will not do, and its value as a recruiting force for the trained regiments would only become important in the event of a protracted struggle. There are, moreover, grave reasons, from the point of view of the Chinese Government, against giving this branch of its army any modern efficiency, for the slender, if at present sufficiently secure, hold on the provinces possessed by the Central Government might snap if ambitious Viceroys and disaffected subjects controlled regular and well armed troops. With these remarks we may now turn to what may be called the new regular army of China.

The main object of military reform in China has been the defence of the capital and the approaches thereto, the necessity for which was brought home to the Court by the Anglo-French expedition in 1860. When the Taeping rebellion was finally crushed, the Ever Victorious Army, with which the name of General Gordon will always be identified, was disbanded, and the Viceroy Li Hung Chang took into his pay a considerable number of these disciplined and experienced soldiers, who had taken their part in a succession of remarkable achievements. When Li Hung Chang was transferred as Viceroy from Kiangsi to Pechihli, he took with him these men as a sort of personal bodyguard, and with the avowed intention of organizing an army that would bear comparison with European troops, and that should render Pekin secure against foreign insult and attack. He has been engaged on this task for nearly 25 years, and, if he has not attained perfect success, he has at least deserved it. At the commencement this force numbered about 18,000 men, composed partly of Gordon's old soldiers, partly of drafts from the Green Flag army raised by Tseng Kwo-fan for the siege of Nankin, and partly of Taeping prisoners, and it was known as the Shen-che Ying or Divine Mechanism army, which meant in plain language that it was armed with rifles. After the Franco-German war the Viceroy took into his service several German officers, of whom Major von Hanneken, whose name has of late been frequently mentioned, was perhaps the chief; and these officers devoted themselves with untiring energy and zeal to the conversion of what was not unpromising material into a regular army of the highest standard. The training of this force has been carried on with the greatest possible secrecy at Kalgan and other places, and the few regiments employed at Tientsin and in the Taku forts were only drawn from it after they had been subjected to a severe preliminary training. Of the main body no European officer except those serving with it has had any opportunity of forming an opinion, but it is known that the Black Flag army, as it is now called, of the Viceroy Li Hung Chang, is now divided into the three branches of infantry, cavalry, and artillery, and that it numbers about 50,000 men with the colours. In addition to that total, it is said that there are as many more reserve men who could be called up whenever required. The infantry are armed with Remingtons, the cavalry with Winchester repeating carbines, and the artillery have Krupp's 8-cm. field-pieces. A report of one of the foreign officers attached to this force speaks in the highest terms of the steadiness and efficiency of all arms on the parade ground, and the physique of the men is described as magnificent, and equal to the *élite* of European armies. The only fault found with the force by the writer is that too much care has been taken of it by the Government, which has hesitated to employ this costly creation at any distance from the capital. In all the great expeditions for pacifying the empire in the west and the south, this army has never been employed, and even during the war with France only two regiments were sent to the Tonkin frontier at the close of the campaign. But the reluctance is only to send them to a distance from the capital, and during the French war 25,000 of these troops were concentrated at Port Arthur. A campaign in Korea would come within the range of their natural

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duties, and would furnish them with a favourable occasion for displaying their martial qualities and efficiency.

But it must not be supposed that the Black Flag army represents the only force in China to which the terms disciplined and well-armed can be applied. In Central Asia the garrison of the New Dominion has made considerable progress in military efficiency under the direction of its commander, Liu Kintang. Its numbers are probably inadequate for the defence of so vast a region as it has to guard, but the efficiency of the main force at Urumtsi, where an arsenal and dépôt of arms have been established, cannot be gainsaid. Throughout the New Dominion there are probably 30,000 well-disciplined troops and an equal number of irregular levies, but none of these could be prudently withdrawn for purposes of war on the coast. After Li Hung Chang's army, and scarcely inferior to it in strength and importance, come the two branches of the old Tartar army with which the present dynasty conquered the country in the 17th century. These are the old Banner army and the army of Manchuria, both of which have recently been subjected to some military training, and are more or less equipped with modern weapons. The Banner army is still composed mainly of Manchus under their eight banners, the Mongols and Chinese or Han-chun under their separate banners, and the contingents from the Solon and Sibo tribes who were specially renowned for valour in the wars of the 17th and 18th centuries. The total strength of the Banner army is stated to be not less than 300,000 men, distributed as follows:—100,000 in Pekin, 20,000 scattered throughout China in cities like Canton and Nankin, and 180,000 in Manchuria. A considerable number of this large force have not received any regular modern drill, adhering to their old custom of practising with the bow, and performing various athletic and even acrobatic feats. This is not remarkable, considering that success at those exercises is the qualification for the pension paid by the Government to every male Manchu. In Pekin alone the cost of maintaining the Manchus, apart from the Court altogether, is estimated at more than a million pounds a year, but as they are supposed to form the prop of the dynasty as well as the defence of the capital, this sum must not too hastily be set down as excessive. Up to a comparatively recent period nothing had been done to make these troops efficient. Many of them were armed with only bows and arrows and a kind of iron flail, and such as carried firearms possessed only the old national gingall. But about 15 years ago the late Prince Chun, father of the reigning Emperor, took up the question of organizing part of the Banner army after the fashion of the Black Flag force of the Viceroy Li, and he assumed the personal command of what has been called the Pekin Field Force. Its strength has been estimated at 20,000 men, and he raised it to a considerable point of efficiency, although probably not as high as that of the Black Flag army, if only for the reason that he did not employ any European officers. As material for a useful and formidable army the Manchus of this particular force cannot be surpassed, and there is no reason to suppose that the efforts to add to its numbers and efficiency have been seriously relaxed since the death of Prince Chun.

With regard to the second Tartar force, the army of Manchuria, its exact numbers are not easily to be ascertained, but it is raised from the 180,000 Banner men on the register in the three divisions—viz., Fengtien, Kirin, and Heilung-chiang—of that vast province. The Mongols also furnish many recruits, especially to the cavalry, and the Chinese population has increased in an almost extraordinary manner during the last few years, and, as military service is obligatory, could be drawn on in case of necessity. How large a proportion of these numerous tribesmen, whose *métier* is supposed to be fighting, have received any training and modern weapons is matter of diverse opinions and estimates, but the best information puts them at 80,000. There are a number of facts which show that this is not excessive, and among these might be mentioned the circumstance that the Governor of Kirin alone held a review of 15,000 men armed with Mauser rifles which was witnessed by several English travellers. Moukden, the chief town of Fengtien and the old capital of the Manchus, is the headquarters of the southern division of the army of Manchuria. Kirin of the middle division, and Tsitsihar of the northern division, or Hei-lung-chiang. It is believed that the strongest numerically and the most efficient is the first-named division, which probably numbers

30,000 men, all armed with rifles. Unfortunately these troops do not possess uniform weapon, the picked regiments having Remington repeating rifles and the others Enfields. The artillery attached to this division consists of four batteries of Krupp field pieces, besides a considerable number of heavy siege guns placed in the forts that have been constructed along the Russian and Korean frontiers. For operations in Korea, the Fengtien division is one that would be mainly called on for troops, and there is little doubt that a considerable portion of its strength has already been despatched to the Yalu river which separates Fengtien from Korea. In this quarter it could easily join hands with the Black Flag army of Li Hung Chang, and thus a very large Chinese force could be concentrated for an advance by land along the main road often traversed by Chinese armies in the past to Ping-yang and Söul. If the totals mentioned are added up, it will be found that at the most moderate computation China possesses between 150,000 and 200,000 troops armed with rifles, all of whom are placed in such a way as to render it easy to employ them in Korea, and that only arms are wanting to enable her at once to double that number with hardy, if imperfectly trained soldiers, from the northern and more warlike races of the Empire.

At the present moment, as the telegrams show, the Chinese Government is endeavouring to purchase arms in every direction, but it must not be supposed that it is altogether dependent on outside sources of supply in this respect. The Chinese arsenals at Foochow and Nankin have been in existence for nearly thirty years. More recently a model arsenal was founded at Kiangnan. German officers and engineers have made Port Arthur, on the shores of Leaoutung, and Wei-hai-wei, near Chefoo, efficient and formidable. Port Arthur—the headquarters of the northern fleet—is naturally a very strong position, and nothing has been omitted to make it stronger by art. It is protected by no fewer than 13 forts armed with heavy Krupp guns, and the artillerymen have been specially trained by Captain Schnell, another German officer. The permanent garrison numbers 7,000 men, and in addition to the guns in position there are several field batteries. There are all the most recent scientific appliances, electric search lights, torpedo factories, &c., and the forts are connected by telephone. Wei-hai-wei, where everything has also been carried out under German direction, is in no respect behind Port Arthur, and it is well known that the Taku forts now bristle with Krupp's ordnance and could not be turned as they were by Sir Hope Grant in 1860. Arsenals have also been established at Moukden, Kirin, and Tsitsihar for the three branches of the Manchuria army. That at Kirin is the most active and efficient, and the statement has been soberly made by a rather sceptical English traveller that this "large establishment is filled with foreign machinery, some German, some English, with boilers and engines and steam hammers, just such as one might see at Woolwich or Elswick, all erected and managed by Chinese without foreign assistance of any kind." Mr. James goes on to declare that it can turn out anything from a gingall to a repeating rifle. There is no reason to suppose that the arsenals at Moukden and Tsitsihar are less efficient. Another striking piece of evidence as to the energy and thoroughness with which the Chinese Government has devoted itself to the task of strengthening its position on the Russian and Korean borders, is the number of new forts it has constructed in that region, and the manner in which it has armed them all with the largest Krupp guns. Eleven places between Aigun on the Amour and Shanhikwan on the Gulf of Leaoutung have been specially fortified on a systematic plan of defence; but in the most out-of-the-way and least-suspected places—at Sansing on the Songari and Hunchun on the Tiumen, for instance—travellers have come across formidable and well-equipped forts. It will be noted that, although the rifles of the infantry are not uniform, the artillery is exclusively of Krupp's manufacture. There may be points of weakness in China's military resources and position in the northern provinces, but there can be no doubt that she has spent enormous sums of money, and that she has made the most strenuous efforts to strengthen herself as a military Power where she was weak and most threatened, so that the strongest Power might well hesitate to attack her on her own battleground.

In conclusion, attention must be called to the real point of weakness in the military strength of China. The raw material of which the Chinese Army is composed

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is as good for the purpose as any in the world, and the statement that those troops who have been drilled make an excellent show on the parade ground can be accepted without reservation. But it requires more than efficient soldiers to make a victorious army, and without skilful leading, the best-trained troops must be of little value in the open field against a capable commander. The Chinese have, as was to be expected from their character, shown remarkable self-confidence in dispensing as far as possible with European advisers, and they have gone about their military matters in their own way. The few foreign officers have been employed as drill masters and musketry instructors, in constructing harbours and arsenals, but they have never been allowed to command an army or even part of an army. In the present crisis the active command is stated to have been given to Liu Min Chuan, a civilian who showed some energy and capacity in Formosa, but who is quite incapable of manoeuvring the large army that China can send into Korea. In a time of stress and trouble the Chinese practice of putting civilians at the head of their armies is calculated to result in grave disaster, and the disaster will be all the greater when the war has to be one of an offensive character. Even among the military officers of the Empire it is doubtful whether there is one qualified to lead an army in the field, although several could be mentioned who, with a European officer at their elbow, might be intrusted with the nominal command, and thus save the *amour-propre* of their countrymen. The late Captain Gill, writing on this point, has said with much force, "prompt action, readiness of resource, ability to seize on the smallest advantage, or to neutralize a misfortune, and the power to evolve fresh combinations, these are the qualities which make a soldier, and these are the very qualities that cannot coexist with Chinese want of originality and reverence for antiquity." Unless therefore the Chinese Government will rely on some of its German officers, who may naturally feel excited to emulate the deeds of Gordon, and compel Liu Min Chuan to abide by their directions, an offensive campaign in Korea could not be undertaken without anxiety as to the result, although the Chinese far surpass the Japanese in numbers, resources, and wealth. In this respect China must be deemed fortunate in the escape of Major von Hanneken, who had gained the confidence of Li Hung Chang, and who with the other officers still available can undoubtedly render efficient service if the Chinese care to employ them at the front. This will probably not be until after the first reverse, when China may realize that something more than well-armed and drilled troops are required to bring a war to a successful issue. If the Japanese are to be expelled from Korea, there must be a skilful concentration of China's vast forces, a simple and sensible plan of campaign, and, above all, a man who can and will see that the necessary measures are properly carried out. China has accomplished much in the way of military reform, but she does not possess any properly qualified commander for an army, and if she persists in ignoring this fact she may, notwithstanding her undoubted preponderance of strength over Japan, incur disaster and humiliation that might be avoided. Perhaps her bitter experience at sea, which her late English Admiral, Captain Lang, would probably have saved her, may open her eyes to the fact that in war she cannot yet dispense with European leading.

France.—The country chosen for the chief manoeuvres of this year is the district of the Beauce, a bare, gently undulating plain, very favourable to cavalry provided the weather becomes dry, but in that case the work will be very severe on the infantry, as it is almost destitute of shade and relatively waterless. As far as can be ascertained at present, the chief encounters will probably take place between the great bend of the Loire below Orléans and the first spurs of the Perche beyond Chateaudun. The 4th Corps, of which the bulk of the infantry comes from Paris, will concentrate between the 5th and 11th September by march route about Patay and Coulmiers. The 11th Corps arrives by rail from Tours and Blois, and will rendezvous about Artenay on the Paris-Orléans Road. The manoeuvres, *corps versus corps*, commence on the 12th September. The 4th Corps will be driven back on Chateaudun, where, as already announced, the grand review and final battle will take place.

The opportunity thus afforded to study both the ground over which the fighting

in 1870 took place, and also seeing the new French army at work, should be taken advantage of by officers interested in their profession.

Fortress manœuvres on a large scale will take place under the direction of General Saussier on the eastern front of the Paris defences between Vaujours and Chelles. Three divisions of infantry and special formations of engineers and artillery, amounting in all to some 24,000 men, will be employed. Special interest should attach to these operations, as Fort Vaujours, in itself one of the most powerful works in the whole line, is at the same time the most exposed to an enveloping attack from the north-east, and great difficulties were met with in adapting it to the ground. How far these difficulties have been grappled with these coming manœuvres ought to demonstrate.

An Historical Error corrected.—The Ministry of the Interior, on the demand of the Minister of War, has ordered that the inscription on the monument erected at Talant near Dijon on the 1st April last should be erased, as it contains an assertion not warranted by facts, viz., that the colours of the 61st Prussian Infantry taken at Dijon were the only ones captured in action during the last war. This is not the case, for, on the 16th August, Lieutenant Chabot, of the 57th de Ligne, took in action the colours of the 16th Prussian Infantry, and the colours of the 57th de Ligne are decorated to commemorate this event. ("L'Avenir Militaire.")

Cavalry Reserve Regiments.—The "Journal Officiel" has promulgated the order for the formation of two regiments of reserve cavalry. The districts in which the experiment will be made will not be designated finally till 10 days before the date fixed for the commencement of the mobilization. "L'Avenir Militaire" considers that Vendôme in the district of the 5th Corps, Angers in that of the 9th, and Alençon are the most probable places to be selected, as they are the chief centres of horse breeding in the country. The experiment should be most attentively watched, as it will go far to settle the question of the value of reserve cavalry formations in other countries besides France.

The Kola Nut.—The "Revue du Service de l'Intendance" for June, 1894, contains an interesting note, by Dr. Gustave le Bon, on the properties of the kola nut well worth the study of soldiers and travellers. The nut grows along a belt of Central Africa extending from the west coast up to the head waters of the Nile, and its extraordinary qualities in conferring endurance and practical immunity from thirst have been long known to the natives of those parts, but have only recently become known to Europeans.

Interesting details as to the degree of resistance to hardship and power of prolonged labour developed by its use will be found in the report of the British Consul at Bahia for 1890, from which Dr. le Bon quotes the following instance: "A sack of sugar weighing 200 lbs., rejected as too heavy by the young Brazilian porters, was picked up with ease by an aged African accustomed to the use of the nut, and carried by him for 12 miles in the day." Further very remarkable information is also to be obtained in the monograph of Professor Heckel, of the School of Medicine at Marseilles, on the African kolias, a work of 400 pages, published in Paris, 1893.

Experiments made in Europe hitherto have given divergent, and frequently unsatisfactory results, owing mainly to the fact that the only nuts available commercially for the purpose reach us in a dried condition, and the natives, trading on the ignorance of the buyers, adulterate their consignments with so-called "false" kola nuts, which possess no special properties whatever.

Another cause of difficulty arises from the ignorance of European chemical experts as to the real nature of the chemical basis of the nut. Broadly speaking caffeine and theobromine are its essential characteristics, and the restorative qualities of caffeine being well known, it has been assumed that this is the active principle of the stuff. Dr. le Bon shows that this is not the case. According to his experiments, neither caffeine nor theobromine alone gives the required result, a mixture of the two, in the proportion by weight of five of the former to one of the latter.

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latter, are required for the purpose, and these give results at least equal to those of the fresh nut.

M. Heckel started a company to manufacture kola biscuits of sugar and flour, but the company has since gone into liquidation, and Dr. le Bon states that he is not surprised, as these biscuits had "un goût détestable." It appears that these are the biscuits used by Messrs. Conway and MacCormic in the Kharakorum, and also recommended in the "Travellers' Guide," published under the auspices of the Geographical Society.

Dr. le Bon's advice is to import fresh nuts, properly selected, direct from the West Coast, and suggests that no difficulty exists to this proceeding; he has done so himself, and obtained his nuts at a cost of 3 francs per kilo., using, as sole precaution, a packing of moist leaves.

Our own experiments have been made with the ordinary dried nut of commerce, or with the various alcoholic extracts of the nut to be obtained from any chemist. Like Dr. le Bon, we have found considerable irregularity in the results, but in the great majority of cases the nut has thoroughly satisfied our anticipations, having enabled us to accomplish marches over mountainous ground, and without food or water, which were absolutely beyond our unaided physical capacity. As it was suggested by friends in the A.M.S. that these results were merely due to the aid of imagination, prolonged experiments were carried out on horses and ponies, and these animals responded to the stimulus more markedly than human beings.

As matters now stand, we should prefer the fresh nut if available, but in its absence would much rather rely on the ordinary nuts and preparations to be obtained at the Army and Navy Stores, than on any other concentrated food preparations with which we are acquainted, and we have tried most of them.

Arrangements are now being made for a consignment of these nuts, fresh, and selected by experts on the spot, and we shall be glad to afford every aid in our power to officers interested in the matter.

Germany.—The following is the programme for the manœuvres of the 1st and 17th Corps under the direction of the Emperor:—The 1st Corps, 5th September, grand parade at Königsberg; 6th, corps manœuvres near Königsberg; 7th and 8th, marches between Elbing and Braunsberg; 9th (Sunday), halt; 10th, 11th, and 12th, manœuvres against the 17th Corps between Elbing and Braunsberg. For the 17th Corps, 7th September, grand parade at Elbing; 8th, corps manœuvres near Elbing; 10th, 11th, and 12th, manœuvres against the 1st Corps as above. The theatre of operations is bounded by the railways Danzig—Königsberg and Danzig—Warsaw, and to the eastward extends up to the Russian frontier. The ground is sandy, marshy, intersected by lakes, watercourses, and drainage cuts, with large tracts of pine forest; on the whole, most unfavourable to the action of cavalry and artillery on the battlefield. The Berthon boat equipment supplied to the cavalry for experiment is likely to have a searching trial, and should be watched by any of our officers present. The mounted orderlies for infantry, also a new creation, deserve attention. The 4th battalions created by the new military law will also be mobilised, and manœuvre with their regiments.

A practical idea has been suggested by Lieutenant Steinitzer, of the Bavarian Field Artillery, having for its purpose the indication of guns in action, in manœuvres, and for judging distances at practice, which will commend itself to umpires and to all who have seen batteries with smokeless powder in action. A line of heliographs are arranged in the position which would be occupied by the guns, and flashes from the heliograph are directed on the troops under fire. Anyone who has watched a heliograph party searching for its corresponding station will recognise how admirably the idea will answer its purpose. On the first occasion the writer had an opportunity of seeing batteries with smokeless powder in the French manœuvres, the flash of the guns was so exactly like the helio flash to which we are accustomed in India that the same thought immediately presented itself. It

would be quite impossible in bright weather for a column under imaginary fire to pretend ignorance, and if it did, the umpire could speedily inform it of its danger.

The following statistics, giving the expenditure of ammunition by the Germans in 1870, are taken from "L'Avenir Militaire," and are worth noticing. For the artillery, 187,000 nine-pounder shells; 137,500 from the 12-pounders; the infantry consumed 20 million cartridges, and the cavalry half a million. Unfortunately no accurate figures as to the effect of all this expenditure on the living targets exist, but, taking the total number of killed and died of their wounds on the French side as 40,000, of which 25 per cent. were probably accounted for by the artillery, we get one man killed for every 683 infantry and carbine cartridges, and, roughly, 30 shell for each fatal hit, or, say, 3 cwt. of ammunition per man. Taking the additional cost in money to the nation entailed by the war at 200 millions, which is within the mark, it appears that each Frenchman killed involved an expenditure of 5,000*l.*, and each German cost the French about three times that sum. Truly there is room for improvement in the arts of mutual destruction.

According to the "Revue Militaire de l'Étranger," the course at the Kriegs Academie is about to undergo reorganization. Geography will cease to form a portion of the curriculum, and it is proposed to eliminate all technical study from the college course, thus giving more time to purely tactical work. The number of officers admitted will also be largely increased. A special technical school will also, it is said, be instituted, in which those subjects at present taught at the Kriegs Academie can be studied by those who desire to become technical specialists.

FOREIGN PERIODICALS.

NAVAL.

Austria.—*Mittheilungen aus dem Gebiete des Seewesens.*—Pola and Vienna. No. VIII. 1894. "The Geophysical Researches of the Scientific Expeditions of H.I.M.S. 'Pola,' 1892-93." "The Naval Proceedings during the Insurrectionary Movement of the Brazilian Fleet, 1893-94." "The Russian battle-ship 'Sissoi-Velikie,' with plans." "Trials of the French battle-ship 'Magenta.'" "Canet's Central-pivit Carriages for Q.F. Guns." "Notes on Foreign Navies." "The Italian Naval Budget for the Administrative Year 1894-95." "Budget Proposals for the United States Navy, 1894-95." "The Armour-plate Trials at Pola, November, 1893. Notices of Books.

Mittheilungen über Gegenstände des Artillerie und Genie-Wesens.—Vienna. No. V. 1894. "Coast Fortifications."

France.—*Revue Maritime et Coloniale.*—Paris. July, 1894. "The Influence of Sea-Power on History" (continued); translated from Captain Mahan's work. "The War in Paraguay." "History of the Port of Lorient, 1803-9." "Vocabulary of Powders and Explosives;" translated from the "Rivista Marittima." "Statistics of Shipwrecks and other Accidents at Sea in 1892." "Foreign Naval Notes." "Report on Sea Fisheries."

Le Yacht.—Paris. 7th July, 1894. "The 'Magenta.'" "The Enquiry into

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State of the Navy" (E. Weyl). "The Spanish Armoured Cruiser 'Infanta-Maria-Teresa'" (with plate). "Naval Chronicle." 14th July. "Quick-firing Guns and the Protection of Ships' Upper Works." "Naval Chronicle." "Launch of the 'Carnot.'" "Results of Modernizing the Engines of four French Mail Steamers." 21st July. "The Manœuvres of the Squadron of the North" (E. Weyl). "The Torpilleur-de-haute-mer 'Chevalier'" (with plate). "Naval Chronicle." "Quick-firing Guns and the Protection of Ships' Upper Works" (continued). 28th July. "The English Naval Manœuvres" (E. Weyl). "The Torpilleur 'Chevalier.'" "The Naval Manœuvres in the Channel." "Naval Chronicle." "Quick-firing Guns and the Protection of Ships' Upper Works" (concluded).

La Marine de France.—Paris. 7th July, 1894. "Mail-boats" (Rear-Admiral Réveillère) (concluded). "A Question of Naval Tactics" (continued). "The Maritime Postal Services." "Naval Chronicle, Home, Foreign, and Mercantile." 14th July. "A Question of Naval Tactics" (concluded). "Studies on the Defence of the Coast; St. Nazaire and the 19th Maritime Section." "Inland Navigation in France." "Naval Chronicle, Home, Foreign, and Mercantile." 21st July. "The Great Councils of the Navy" (Commandant Dufresne de la Chauvinière). "Harbours and Railways." "Naval Chronicle, Home, Foreign, and Mercantile." 28th July. "The Defence of the Coast." "Submarine Cables." "The Chambers of Inland Navigation." "Naval Chronicle, Home, Foreign, and Mercantile."

Le Moniteur de la Flotte.—Paris. 7th July, 1894. "The Lowering of the Age Limit" (Marc Landry). "The Naval Manœuvres." "The Assassination of M. Carnot." "New Scale of Pay for the Seamen." "Naval Chronicle, Home and Foreign." 14th July. "À propos of Pilots" (Marc Landry). "The Naval Manœuvres." "The Fire at Toulon Arsenal." "The Parliamentary Enquiry into the Navy." "The Report on the Submarine Defences." "Naval Chronicle, Home and Foreign." 21st July. "The Naval Manœuvres" (continued) (Marc Landry). "The Colonial Medal." "Naval Chronicle, Home and Foreign." 28th July. "The Naval Manœuvres" (continued) (Marc Landry). "The Parliamentary Enquiry into the Navy." Notes from the Colonies." "Naval Chronicle, Home and Foreign."

Germany.—*Marine Rundschau*.—Berlin, July, 1894. "On the Heating and Lighting Arrangements on Board Ships and their Value from a Sanitary Point of View" (Naval Staff-Doctor H. Dicksen). "A Cruise for Information on board fast Steamers" (concluded). "The Results of the Trials of the Battle-ship 'Wörth.'" "Foreign Naval Chronicle." "Promotions and Appointments."

Italy.—*Rivista Marittima*.—Rome. July, 1894. "Considerations on the Italian Naval Manœuvres," (continued) (D. Bonamico). "The Fiske Telegoniometer and some recent Experiments with it" (G. Santarelli, Engineer and Electrician, Italian Navy). "Inflammatory Compositions, the Origin of Gunpowder and the first Firearms" (E. Bravetta, Lieutenant Italian Navy). "The Maritime Lazaretti and the first Sanitary Regulations of Livorno." "On the Organization of Naval Personnel." Letters to the Editor: "Disembarkation" (C. Airaghi). "On Surface Condensers, Pumps, and other Mechanism" (C. Ferraroni, Chief Mechanician, 1st Class). "The Organization of Naval Personnel" (G. Astuto, Captain of "Aretusa"). "On Reform in the Administrative Regulations of the Naval Personnel." "Naval Notes (Home and Foreign); France, England, Germany, Chili, Japan, and United States." Supplement: "Recent Progress in Marine Machinery" (conclusion) (Naloe Soliani).

Rassegna Navale.—Rome. June, 1894. "On the Zeunersche Water-Action Engines." "The Use of the Heavenly Globe for Rapidly Ascertaining the Geographical Position of a Ship." "The Necessity for Supporting the Merchant Navy" (conclusion). "The Lesson of the Steamship."

Russia.—*Morskoi-Sbornik*.—St. Petersburg. May, 1894. “Regulations for and State of the Corps of Naval Cadets.” “Sea Canals.” “Night Signalling in Ships.” “The Relation between the Indicated Horse-power of Machinery and the Resistance of the Water.” “The latest Improvements in Marine Engines.”

Spain.—*Rivista General de Marina*.—Madrid. July, 1894. “The Marquez Extractor, intended for Use with the Guns of the Fleet.” “On the Relation of the Sound of Fog Signals to other Sounds.” “The Different Navies on 31st December, 1893.” “The Imperial Chinese Arsenals.” “Vocabulary of Powders and Modern Explosives” (continued). “Remarks on the Effect of Ramming.” “Foreign Naval Notes.” “On Steel for Guns.”

Sweden.—*Tidskrift i Sjöräsendet*.—Carlskrona. No. 4. 1894. “How can the Advantages afforded by the Extended Periods of Time of Service and Training of the Seamen be best Utilised for the Fleet?” (conclusion). “The English Naval Manoeuvres of 1893.” “The Events in Rio de Janeiro.” “The Report of the Court Martial on the Loss of the ‘Rusalka.’” “The New Infantry Drill and the Fleet.” “The Fitting Out of the Brazilian Cruisers ‘Nichtheroy’ and ‘America.’”

United States.—*Proceedings of the United States Naval Institute*.—Vol. xx. Annapolis. 1894. “Naval Reform.” “Consideration on the Battleship in Action” (W. L. Clowes). “Exterritoriality and Asylum.” “The Solution for the Elements of the Chronometer.” “Ships’ Boats.” “The Navy and the Nation” (W. McAdoo, Assistant-Secretary of the Navy). “Notes on Naval General Courts-Martial.” “Professional Notes.” “Home and Foreign.”

The United Service.—August. “The Engineer Corps of the United States Navy” (continued). “Origin and Developments of Steam Navigation” (continued).

Journal of the United States Artillery.—July. “Letters on Sea Coast Artillery.” “Notes on Armour.”

MILITARY.

Austria.—*Organ der Militair-Wissenschaftlichen Vereine*.—Vol. xlix. No. 1. “Topographical Studies,” by Colonel Bancalari (with map). Book notices, &c.

Militair Zeitung.—Vienna. No. 24. “The Supply of Bread to Troops in the Field.” “The Bulgarian Army.” No. 25. “At Last” announces the approaching erection of a suitable home for the Austrian equivalent of our Institution, which, however, is to be organised more on the lines of a Club. A German view of our Manœuvres at Grüns; favourable. “The Cavalry School at Saumur” from the “Revue de Cavalerie.” No. 26. “Military Benevolent Societies.” “New Regulations as to Complaints in the German Army.” “Recent Russian Instructions for Manœuvres.”

France.—*Revue de Cavalerie*.—July. “The New Cavalry Regulations;” study of alterations introduced by the Decree of the 11th May of this year. “Marches of the French Cavalry in Turkey, 1854-55.” “The Italian Cavalry.” “Racing in the Army.” “Historical Résumé of the Services of French Cavalry Regiments.” “Military Equitation and Civilian Horsemanship,” by Comte Raoul de Gontaut-Biron; worth reading. “Long-distance March from Agram to Vienna.”

Journal des Sciences Militaires.—July. “Our Colonial Forces,” by General Lewal. “Dernier Effort,” by General Phillebert. “Evolution of Modern Strategy,” translation of a lecture by General Leer at St. Petersburg, which was published in

the July number of this Journal. "Infantry in Action and its Fire Power," by General Libermann. "The Campaigns of 1814," by Weil. "The German Cavalry Divisions from the 8th August to 1st September, 1870." "The War in Mexico," by Colonel Bourdeau.

Le Spectateur Militaire.—15th July. "The Recruiting of the Army in 1893," by L. Brun; interesting statistical summary. "Memoires of Baron Séruzier, Colonel of Artillery," 1783 to conclusion of the Napoleonic Wars; interesting; 1st August. "L'Affaire Edon." "Our next Grand Manœuvres;" should be read by officers proposing to attend them. "More Memoires of Constant," by Noel Desmayons.

Revue du Cercle Militaire.—No. 26. "The Swiss Army in 1893" (*concluded*). A thorough and important summary. "Conclusion of the Translation of Commander Sturdee's R.U.S.I. Gold Medal Essay," No. 27. "Quick Firers for Field Artillery." "The Congo and the Nile" (with map). "Smokeless Powder;" experiments in Roumania. No. 28. "Quick Firers" (*continued*). "The Training of the Russian Militia." "The Congo and the Nile." "The Dutch in Lombok." No. 29. "Abyssinia." "Quick Firers" (*concluded*), with illustrations.

L'Avenir Militaire.—3rd July. "Manœuvres in Mass." "Discussing the question of Rendezvous Formations." "Les Feux d'Infanterie;" review of General Libermann's article in the "Journal des Sciences Militaires," 6th July. "The Old Army;" instructive commentary on the methods of maintaining discipline in the French Army. "Saluting in the Army." "The New Infantry Regulations, 1894." 10th July. "The Law on Recruiting, Article No. 24." "Complaint to the Press of a man sentenced to death for a minor Breach of Discipline at Saigon;" the letter is addressed to Madame Séverine, and should be read by all who wish to understand the conditions of service in French colonial troops. "French Policy in the East." 13th July. "Special Gazette." 24th July. "Europe and Africa." "Algerian Contractors." "The Obedience of the Soldier;" three exceedingly instructive articles.

Revue des Deux Mondes.—15th July. "The Passage of the Niemen."

Revue d'Artillerie.—July. "The Employment of Artillery on the Battlefield in France, Germany, Austria, and Russia," lecture by Lieutenant-Colonel Lebon to the officers of the garrison of Vannes, February, 1894. "Summary View of Artillery Questions of the Day," memoir written by Captain Moch for the Chicago World Exhibition. "Résumé of the Principal Experiments executed by the Austrian Artillery in 1891-92" (*concluded*). Notes. "The German War Budget of 1894-95," a careful analysis deserving study.

Revue Militaire de l'Étranger.—July. "Position Artillery on the Field of Battle in Germany," à propos of recent articles in the "Jahrbücher," by General Speck of the Bavarian Artillery, and a pamphlet published in Berlin by General Wiebe—well worth study. "The Law on Recruiting and the Composition of the Annual Contingents in Russia." "The Programme for the Imperial Manœuvres in Germany, 1894."

Germany.—*Militär-Wochenblatt*.—No. 56. "Further Contributions to the Study of Napoleon's Continental Policy." "Why Napoleon spared Prussia in 1807." "The British Naval Estimates, 1894-95." "Schlagworte;" reply by Captain Hoeing to criticisms on his "Volkskrieg am Loire." Summary of work done by the French topographical staff in 1893. "New Measuring Compass;" description of a new pair of dividers, with scale convenient for use in the field. No. 57. "The Influence of Supply on the Russian Operations in 1831." "Proposal to raise the Field Batteries taking part in the Autumn Manœuvres to full War Strength." "The British Naval Estimates, 1894-95." "Proposed Reorganization of the

Spanish Mountain Batteries." No. 58. "The Influence of Supply on the Russian Operations in 1831." "Is it worth while to practise Pointing (i.e., Tent-peggings) to the present customary extent during the Squadron Drill Season?" calls attention to the risk of laming horses, &c. Military Notes from Russia. Extracts from General Dragomirov's criticisms on operations in the Kieff district, 1893. No. 59. "The Tactics of the Future." "The British Naval Estimates, 1894-95." "A French Verdict on the French Army;" summary of the recent "Figaro" articles. "Summer Drills of the Russian Army." No. 60. "The Tactics of the Future." No. 61. "The Tactics of the Future" (*concluded*). These three letters form an interesting commentary on the works of Scherf and Hoeing, by Boguslawski. His ultimate conclusion is that victory will still fall to the assailant, in spite of all technical improvements in weapons. "The Italian Military Estimates and the Consequences of the recent Crisis." U.S. America cruiser "Marblehead." No. 62. "New Recruiting Grounds for 'Cameroon,' with notes on the Training of Native Soldiers." "The New French Drill Book;" *résumé* of a criticism in the "Avenir Militaire;" should be read. No. 63. "General Graf. Julius von Bose." Obituary.

Jahrbücher für die Deutsche Armee und Marine.—August. "The Mine Crater at Petersburg;" episode from the American War, by Major Scheibert. "French Frontier Defences," by Graf. von Haslingen. "Recent Attacks on the French Navy." "The Drill Regulations of the Republic and First Empire." "Changes in the French Infantry Regulations," Captain Peterman; should be studied.

Deutsche Heeres Zeitung.—No. 53. "The New Orders as to forwarding of complaints on the part of men below the rank of Sergeant." "Notes on the War in Silesia, 1744-45." No. 54. "The French Naval Programme." "The War in Silesia, 1744-45." No. 55. "The Bow is too Tightly Strung" complains of the excessive strain on the company officers, due to interference of their seniors; should be read. "The War in Silesia, 1744-45." No. 56. "Racing and Horse-breeding." "The War in Silesia, 1744-45." No. 57. "Japan and China in Korea." No. 59. "A New March Formation for the Battle-field." Translated from the "Spectateur Militaire." No. 60. "Leg Bandages for Horses."

Neue Militärische Blätter.—July and August, 1894. Berlin. "The Cavalry Divisions of the IInd and Meuse Army in the Operations against the Army of Chalons." "Frederic the Great and his Jägers"—very interesting contribution to the origin of light infantry." "The Raid of a Cavalry Brigade"—an account of the cavalry operations in last year's Russian Manoeuvres on the Narew, when a brigade of cavalry was detached for a four days' raid across the adversary's communications, country marshy, well wooded, with numerous watercourses. "Prince Frederic Charles as Divisional Commander in Stettin"—very interesting. "A Word on the Defences of the St. Gotthard and Swiss Neutrality." "Sketches of Life in the Bulgarian Army." "Bazaine's Rescue"—review of Brialmont's recent work on this subject and of the reply to it in the "Journal des Sciences Militaires;" worth study. "Winter Manoeuvres in the Warsaw and Moscow Districts," with extracts from Dragomirov's remarks. "Letters from Turkey." Book Notices, &c., and a complete catalogue arranged by subjects of all military works and maps published on the Continent during 1893—very valuable.

Switzerland.—Revue Militaire Suisse.—"The New French Regulations for Field Service." "What can the Society of Non-commissioned Officers do for the Development and Instruction of the Landwehr?"

United States.—The United Service.—August. "Physical Training of the Guardsman"—refers to the Iowa National Guard. "Ninety Day Men of '63." "Lord Wolseley's Marlborough," by General Sir Archibald Alison—reprinted from Blackwood. "The Engineer Corps of the U.S. Navy" (*continued*). "Courts-Martial." "Origin and Developments of Steam Navigation."

Journal of the U.S. Artillery.—July. “Letters on Sea Coast Artillery.” “Notes on Armour.” “A New Method of Indirect Laying for Field Artillery,” translated from a paper by von Brilli, Captain K.K. Austrian Artillery. “Professional Notes.” “Book Notices, &c.”

NOTICES OF BOOKS.

The next Naval War. By S. EARDLEY-WILMOT, Captain, R.N. London: E. Stanford. Price 1s.

We are rather inclined to doubt the wisdom of attempts to forecast the results of the next great war; the world moves rapidly in these days, and twelve months may alter materially the relative strength of fleets either for the worse or for the better. In the little work before us, Captain Eardley-Wilmot draws a somewhat gloomy picture of what might happen to us in the event of a sudden outbreak of hostilities between France and England. We do not ourselves fancy that war could be sprung upon us quite so suddenly, or without our Government getting some inkling of what was impending; neither in view of the large number of new first-class torpedo-gunboats now available, however sudden the outbreak of war might be, do we believe that it is possible for any hostile torpedo-boat flotilla to rush Portsmouth harbour in the manner the author describes. Captain Eardley-Wilmot, however, does good service by calling attention to the weak points in our organization, and the more public attention is riveted upon them the better, and there is no doubt that the dual command now exercised by the naval and military authorities at the various naval ports both at home and abroad must lead to confusion, and may land us in disaster on a sudden outbreak of war. It is well known that the Admiralty are unwilling to take on themselves the burden of harbour-defence, but from the fact that, for many years past, at the Home Ports the Naval Commander-in-Chief has been of senior rank to the Commanding General, it would seem as if the authorities contemplated the supreme command being vested in the hands of the Admiral on any emergency arising. There are other important points of difference between French organization and our own to which Captain Eardley-Wilmot briefly refers, and which will interest readers. He wisely, we think, avoids going into details of the battle in the Mediterranean, where our fleet of 10 battle-ships sustains defeat at the hands of the French Commander, who has a force of 15 battle-ships under his flag, the information about the action and its results being afforded to the reader through the medium of a letter from a French officer present to a friend at Paris. In the final chapter the author enters into the “Effects of our Defeat,” and its consequences, and we will only say that his forecast of the ensuing events is by no means an improbable one. In conclusion we may say that Captain Eardley-Wilmot’s little work may be read with advantage, and will repay perusal.

Explosionen der Dampfleitungen auf Schiffen und die Mittel um ihren Verheerenden Wirkungen zu begegnen. By H. GURIT, Geheimer Admiraltätsrath. Berlin: Mittler und Sohn, 1894.

This is a small pamphlet of about 40 pages; the greater part of it is taken up with the lessons to be learnt from the failure of steam pipes, and more especially from the explosion on the Royal Mail Company’s steamer “Elbe” in 1887. The principal causes producing the fracture of steam pipes pointed out by the author are now pretty well known by all the principal engineering firms of this country, consequently there is no need for us to enumerate them here. Great stress is laid on the importance of efficient draining arrangements, and the avoidance, as far as

possible, of enlargements and depressions in the pipe system in which water can accumulate, either when the ship may have a permanent heel or when she is on an even keel. An experiment carried out at Wilhelmshaven, on account of several failures of steam pipes in the German Navy, the details of which were published in the "Marine Rundschau," is described here in order to show the enormous strains set up by water-hammering. Steam at comparatively low pressure was admitted through a small pipe to a larger one, about two-thirds filled with water, at the angle of an easy bend in it, and having a small cock at the far end open to the atmosphere. It was found that after a slight discharge of air and vapour through the escape cock, violent oscillations of the water in the large pipe were produced; the maximum blow transmitted as registered by pressure gauges being equal to 30 times the pressure of the steam supplied; it was also considered that this might be greatly exceeded with high-pressure steam and more unfavourable conditions than obtained in the experiment.

With regard to arrangements for minimizing the danger to life in the case of fracture of a main steam pipe, Herr Gurlt proposes: 1st. A double valve to the boiler steam stop valves, the two valves being on the same spindle and kept apart by a spring, the inner valve closing by the pressure within the boiler, and the other by external pressure. In this way a sudden fall of pressure in the steam pipe caused by its rupture would result in the internal valve being closed by the rush of steam from the boiler, and so shut it off automatically. 2nd. The steam pipe to be enclosed in a casing having outlet pipes leading to the atmosphere. 3rd. Complete isolation of every compartment in which such an accident as that we are discussing could happen. 4th. Ventilating discharges and uptake pipes so arranged that a rapid diffusion of the escaping steam would take place, as it was shown in the case of the "Elbe" that there was perfect safety in the short passage leading from the engine room to within a few feet of the ruptured steam pipe by reason of the plentiful supply of air, as a strong current was passing through this passage from the wind-sails in the engine room. 5th. Convenient escape ladders in positions where there would be a strong down draught which would keep them free from the rush of steam. 6th. Water-spray pipes at the outlets from stokeholds, &c., which could be turned on in case of accident to condense the steam and keep down the temperature. Experiment by the author on a small scale in this direction gave very promising results, and he advocates further experiments on a large scale with these water or air-spray pipes. In conclusion, he says one can hardly imagine any calling in which greater self-devotion, courage, and presence of mind in danger are required than in that of our engineers and stokers, and it is our duty to confirm and strengthen these qualities in them by surrounding these men, on whom the safety and success of the whole ship depends, by all the safeguards which science can provide. We hope that Herr Gurlt's earnest desire to prevent the terrible loss of life which has resulted from explosions of steam pipes, &c., on board ship, may arouse all the attention which the subject deserves from ship designers and engineers.

It is noticeable that no mention is made by the author of the recent terrible accident on board the "Brandenbourg," no details of which have ever been published as far as we are aware. This is much to be regretted, seeing that nothing but good could result from the publication of all the circumstances which contributed to this terrible disaster.

T. J. H.

General der Cavalerie Freiherr von Edelsheim Gyulai—a Character Study. Leipzig: Otto Wigand. Price 1s. 6d.

From the pen of an Austrian officer evidently well acquainted with his subject. He gives the General full credit for his services in Hungary and Italy, but attacks him sharply on other points of a personal nature. The book will probably draw replies from which by weighing the evidence we may arrive at useful conclusions. The reason why we in England should study this life is, that Edelsheim was the maker of the Austrian cavalry, and what he did not know about horsemanship and cavalry training is scarcely worth knowing.

F. N. M.

Monsieur de Salomon : Mémoires Inédits de l'Internonce à Paris pendant la Révolution 1790-1801. Par L'ABBÉ BRIDIER. Paris 1890.

This book is fascinating ; though possessing no direct military interest it should not be neglected by anyone desirous of really understanding the evolution of the French Republican armies, and ultimately those of the Empire. Every national army is an exact product of the causes at work in the nation it represents, and can only be understood through the study of the social conditions which evolved it.

F. N. M.

History of the 1st Battalion Princess Louise's Argyll and Sutherland Highlanders. By Lieutenant-Colonel PERCY GROVES, Royal Guernsey Artillery. (W. and A. K. Johnston, Edinburgh and London, 1894.)

It cannot be said that the old 91st Argyllshire Highlanders has not had ample justice done to its distinguished services. Apart from the very creditable illustrated record which Messrs. Fullarton produced in Edinburgh about 20 years ago, in their histories of the Highland clans and regiments, Lieutenant-Colonel, now General, Robley wrote an excellent brief history at Cape Town in 1883 ; and in 1891 Captain G. L. J. Goff published a fairly exhaustive record, which was well illustrated and compiled with considerable care. In these circumstances the occasion for a further publication within so short a time is not apparent, unless some important events hitherto unrecorded have since come to light, which, however, a perusal of Colonel Groves' volume does not reveal. But if, as is imagined, Colonel Groves' present publication, though produced in different form, is a further instalment of his popular histories of the Scottish regiments, it may be welcome to many who are indisposed to purchase Captain Goff's more expensive history. It is certainly very nicely got up, the printing is good, the paper good, the illustrations by Mr. H. Payne are very attractive, and last, but not least, the literary portion of the work has been carefully compiled. Colonel Groves, in his allusion to the nationality of the old 74th Argyll Highlanders, disbanded in 1783, is quite correct in saying that less than 600 were Highlanders ; but he may not be aware that the county was being drained of its best men by the Argyll Fencibles, which were raised simultaneously by Lord Frederick Campbell, and in which service was very popular. Over 700 fine Argyllshire men were monopolised by this Fencible regiment.—R. H.

The Unemployed. By GEOFFREY DRAGE. London : Macmillan. Price 3s. 6d.

This book should prove useful to the many officers who are endeavouring to provide outlets for the labour of the Reserve men. Any amount of energy is annually misapplied on this field for sheer want of accurate knowledge of the problem to be dealt with, and this knowledge has hitherto been buried away in Blue Books and Returns not generally readily procurable. Mr. Drage's work summarizes in convenient form the main factors to be borne in mind, and further more detailed information will, it is hoped, be available, when the evidence before the Committee on the employment of discharged soldiers is issued. [F. N. M.]

Sandow's System of Physical Training. Edited by C. MERCER-ADAM. London : Gale and Polden. Price 12s. 6d.

Sandow's own physical development is the best guarantee of the general excellence of the system of training he advocates ; at the same time we must admit that this book does not convince us that his method will lead to the same results in all cases. Nevertheless we can recommend it cordially. Physical strength and endurance is still as great an element as ever in successful fighting, in spite of repeaters and other mechanical improvements, and the more widely sound information on the subject is diffused the better our guarantee of ultimate victory in the field.

F. N. M.

Among Men and Horses. By HORACE HAYES, late Captain "The Buffs." London : Fisher and Unwin. Price 16s.

Captain Hayes's numerous works on horses and veterinary subjects are sufficiently familiar to most military readers. The book now before us, though in the main but a narrative of personal experiences, is full of hints on horses and horsemanship which serve to fill out and explain his more elaborate publications. It should be read in conjunction with his illustrated "Horse-breaking." F. N. M.

Geschichte des Königlichen Preussischen Fusilier Regiments Königin. (Schleswig-Holstein). No. 86. VON WIDECK, Hauptmann und Kompagnie Chef im Regiment. Berlin : Mittler. Price 8s. 6d.

This regiment was raised in 1866. Its history is chiefly remarkable for the account given in it of the battle of Beaumont and the part it played in destroying the French Cuirassiers in that action. Details of life in quarters, on the march, and on outposts all help to fill in the picture of the war in 1870 as it actually was and in so far are of general interest. F. N. M.

La Question de Nancy et la Défense Nationale. Par CHARLES MALO. Paris : Berger Levrault. Price 1s.

This little pamphlet proposes the construction of another entrenched camp, having Nancy as nucleus. It is chiefly of interest as an indication of the complete misconception of the nature of modern war which still exists amongst a vast number of Frenchmen. What France requires, according to this author, is a Tamerlane or Bonaparte to lead the millions to the slaughter. Without a proper Staff to aid him this is precisely all even a Bonaparte could achieve. F. N. M.

Geschichte des Garde Jäger Bataillons, 1744 bis 1894. VON RENTZELL, Major im Pommerschen Jäger bataillon No. 2, Adjutant der Inspection der Jäger und Schützen. Berlin : Mittler. Price 13s.

This history possesses more than usual interest for British officers, for the "Jägers" are a corps for which we have no exact equivalent, the only point of resemblance between them and our "Rifles" lies in the colour of their uniforms, and even these differ markedly in the shade. From the first the Jägers have been recruited from a special class of men, viz., foresters, gamekeepers, and the like, without reference to height but with considerable regard to character and education. As a consequence, their training has always been markedly in advance of that of the line, and though their exploits do not appear to have excelled those of our own "Rifles" one cannot help thinking that the latter might have excelled themselves, had circumstances permitted us to exercise the same care in selection which they and the Germans have always done. F. N. M.

La Belgique sous L'Empire et la Défaite de Waterloo, 1804—1815. By SYLVAIN BALAN. Paris : Plon Mourret et Cie., 1894. Price 6s.

The Organization and Administration of the Lines of Communication in War. By Colonel G. A. FURSE, C.B. London : Clowes, 1894.

This valuable book has reached us too late for review in this number.

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